1981

M.O. & School

75¢ #811 P

Centuri

Flying Model Rocket Catalog

CENTURI

YEAR OF THE BONUS PACKS

22 NEW PRODUCTS

"WAR IN SPACE" KITS

SPACE SHUTTLE COLUMBIA

LOWEST-COST STARTER SET

INCLUDES:

ROCKET TIMES Magazine

AEROSPACE TEAM News

4 Exciting CONTESTS

8-Page FLIGHT MANUAL

Prod. No. 5346

RED-EYE™ SPY SATELLITE

The Red-Eye photo-reconnaissance satellite keeps watch over military build-up. Easy to build kit includes pre-cut parts, dowel stabilizers and chrome decals. Red-Eye rockets skyward, ejects streamer-recovered engine then drifts gently back in slow gyro spin.

SPECIFICATIONS
Body Length 4.0" (10.2cm)
Full Length 8.75" (22.2cm)
Body Diam. .76" (1.9cm)
Net Weight .3oz (8.5g)

Skill Level 1

$2.00

Centuri

NEW WAR IN SPACE™

Top-secret military satellite weapons are appearing in today's headlines. Centuri's versions fly now, even before the world powers announce theirs!

Prod. No. 5345

SATELLITE KILLER™ LASER-ARMED!

SPECIFICATIONS
Height 6.5" (16.5cm)
Full Diam. 12.25" (31.1cm)
Net Weight 3.5oz (99.2g)

Skill Level 3

$7.00

This near future defense satellite is designed to identify and attack enemy satellites, using special electronic and laser equipment. (Combat simulated here: models are not intended to actually fly together). Centuri's version safely launches and recovers by rear-ejection parachute. Kit includes all pre-cut fibre parts, huge sheet of 3-color chrome decals and "laser antenna" removable for flight.

SAVE OVER $1.00
COMBO BONUS PACK!
PROD. NO. 5347

"Killer" value:	$7.00
"Red-Eye" value:	2.00
Total value:	9.00
Pay only:	7.99
You save:	$1.01

Recommended engines listed on page 38

THIS CATALOG PROPERTY OF:

Name

Address

City State

Welcome...

TO THE MOST EXCITING HOBBY IN THE WORLD!

Greeting, friends old and new. If you are new to model rocketry, you are about to join the worldwide fraternity of rocketeers who build and fly the Centuri way.

Imagine the rocket YOU built now on the launch pad. After a dramatic countdown, the engine roars to life and your model soars a thousand feet skyward. You wait anxiously . . . and then see the parachute blossom and gracefully bring your rocket safely back for another flight!

If new, you should read pages 4 & 5 and the enclosed Flight Manual. We recommend you start with an outfit; it's the easiest, least expensive introduction. Copies of this catalog distributed by stores do not contain prices; prices may be seen on packages in the stores.

Our biggest "new product" this year is our Bonus Pack program tied into one-half of our 22 actual new products. See the unique War in Space kits and their Combo Pack (pg. 2), three big new military kits with bonus engine (pg. 32-33), two new Flight Packs with built-in engine savings and bonus wadding (pg. 35), new Sure-Shot II igniters with money saving 12-pack (pg. 39) and the new low-cost Thunder Hawk Outfit with 3 bonus engines (back cover). 1981 is Centuri's Year of the Bonus Packs!

Other new products to look for include the clean lined Spirit of America kit (pg. 13), new high-thrust B8 engines (pg. 39), low-cost Lightning Bolt Launcher (pg. 40), heavy duty launch rod (pg. 41), Magnum-D engine mounts with bonus engine locks (pg. 46) and the newly published book on page 48. This is our biggest selection ever, of new products for you.

Come fly with us!

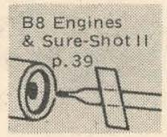
Grant Grant Boyd

Centuri Engineering Co., Inc.
Box 1988, Phoenix, Arizona 85001

SR-71 Blackbird
cover photo courtesy of
Lockheed Aircraft Corp.

YEAR OF THE BONUS PACKS

SOME OF OUR 22 NEW PRODUCTS FOR 1981!



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★ Star indicates a "Bonus" new product.
● Dot indicates a regular new product.

THE HOBBY INDUSTRY OF AMERICA PROMOTES ACHIEVEMENT
NAR NATIONAL ASSOCIATION OF ROCKETRY
TMA TOY MANUFACTURERS OF AMERICA, INC.
CANADIAN ASSOCIATION OF ROCKETRY

Model rocketry is a nationally recognized hobby with a safety record of over 100 million successful launches.

Centuri Enerjet model rocket engines are tested and certified by:
● National Association of Rocketry ● Truesdail Laboratories, Inc.
● Canadian Association of Rocketry ● Canada Dept. of Energy
Centuri complies with model rocketry standards established by:
● U.S. Health, Education & Welfare ● U.S. Dept. of Transportation
● Consumer Product Safety Commission ● Federal Aviation Admin.
● National Fire Protection Association ● U.S. Postal Service
Model rocketry is endorsed as a safe & rewarding activity by:
● N.A.S.A. ● Boy Scouts of America ● U.S.A.F.

HOW TO GET STARTED WITH Centuri

Start with an outfit

Outfits

Centuri outfits and starter sets have everything you need to fly—kit, launcher, engines, and flight supplies, plus easy-to-follow instructions. All you need is a battery, some simple modeling tools and you're ready to begin. Look over the outfit section on the next several pages and get started now!

Kits

There are over 60 to select from including beginner's rockets, multi-stage rockets, military tactical missiles, science fiction, scale models, jet fighters, space ships, boost gliders, payload carriers, and others. Kits do not include engines, glue, paint or launcher.

Engines and Flight Supplies

24 different N.A.R. approved Centuri rocket engines are available plus igniters, chute wadding, shock cords, parachutes and more. Our Magnum-D line of rocket engines are unmatched for high power dependability.

Launchers

Launch systems (in all outfits) are also available separately for when you're ready to move up.

Parts

Centuri has the largest selection available including custom assortments for both the beginner and the advanced rocketeer. With these parts you can build rockets of your own design.

USING THIS CATALOG:

Name → Boldest word/s.

Kit Features Information → Details of flight, performance, building and finishing.

Kit Number → Product number, usually 4 digits.

Price → Subject to change without notice.

Physical Specs → Specifications of length, diameter and weight without an engine.

Skill Level → Numbers from 1 to 5 which show degree of challenge.

Engine Info → Choose your kit, then see the chart on page 38 for recommended engines.

Age and Skill Level

SKILL LEVEL				
1	2	3	4	5
Beginner		Intermediate		Advanced

The Skill Levels and symbol are shown on all kit pages.

Model rockets are recommended for age 10 and up. Adult supervision suggested for those under 12 years. When choosing a kit check the skill lveel number shown in catalog or on package.

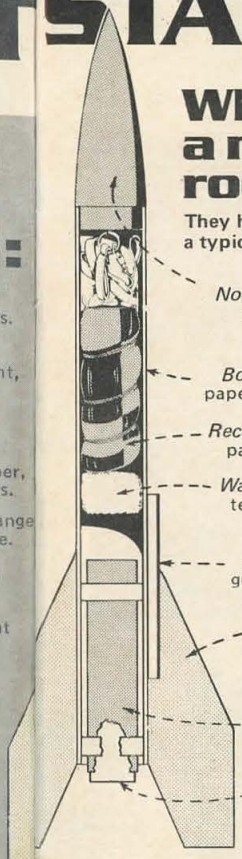
1. Simple To Build—For the beginner with no previous model rocket experience.
2. Easy To Build—Experience in other modeling hobbies—built and flown Level 1.
3. Average Challenge—Built and flown both Levels 1 and 2.
4. Above Average Challenge—Staging, boost glider or scale model rocket experience.
5. Advanced Challenge—A continued and solid background in model rocketry.

Special Items

Certain Centuri products are too specialized for retail stores, and are available only factory-direct, from Centuri. Some examples in this catalog include fin units and certain literature in the Publication chart; all are marked "Special Items." To order, include $1.00 for postage and handling, send to Centuri Dept. 719.

What is a model rocket?

They have different shapes . . . a typical rocket is shown.



Nose Cone: Plastic or balsa Guides air around rocket.

Body Tube: Special strong paper tubing; the "airframe."

Recovery System: Usually a parachute, for safe descent.

Wadding: Flame proof material protects chute when ejection charge ignites.

Launch Lug: Small tube guides rocket off launcher.

Fins: Balsa, fibre or plastic. Fins keep the rocket going straight up.

Engine Mount: Holds the engine in place.

Rocket Engine: Safe, non-reusable device. A new engine needed for each flight.

How do they fly?

④ **Apogee:** Peak of flight.

③ **Coasting:** powered flight ends; delay charge allows rocket to gain altitude.

⑤ **Ejection:** engine charge pushes out the recovery chute.

② **Lift-off:** from launcher; power flight starts.

① **Ignition:** by electrical launcher.

RECOMMENDED BATTERY

6 VOLT "LANTERN"	
Bright Star 158	Ray-O-Vac 918
Burgess TW-1	RCA VS317
Eveready 731	Sears 4707
Mallory M-918	Ward 8MW
Marathon 896	Wizard 7D8918

You may substitute other 6 volt brands of the same physical size.

A typical Centuri kit

Unless otherwise stated, all model rockets for sale in this catalog are hobby kits requiring assembly. Centuri kits are made from a wide variety of materials; balsa, plastic or paper. Each is chosen for light weight for high altitudes. For best appearance some painting is usually required. All kits include a recovery system, and almost all have decals. Tools, engines, paint, glue and launchers are not included. See Flight Manual for recommendations on tools, finishing and painting. Centuri kits are recognized for high quality, clear instructions and innovative parts design.

⑥ **Descent:** Gentle recovery. Can be flown again.

FULL ONE YEAR
Warranty
Centuri assures your satisfaction with our products.
See page 63

Centuri MODEL ROCKET OUTFITS

EAGLE POWER™

The best way to start!

EAGLE POWER is our most popular starting outfit and really gets you off to a "flying start" in model rocketry. The big box contains everything you need to fly. All you need is a 6 volt lantern battery and a modeling knife and you're ready for the launch pad! Attach the ignition wires, and prepare for countdown—safety key inserted, your Screaming Eagle rocket streaks skyward— then listen for chute ejection, and see the chute blossom as your rocket begins its descent for another flight. Fly it again and again, and any other Centuri rocket too. You're now on your way as a Centuri rocketeer!

Prod. No. 5404 Skill Level 1 $14.95

EAGLE POWER INCLUDES:
- Screaming Eagle Kit
- Glue & Supplies
- Powr-Pad Launcher
- Mini-Manual
- 2 Engines & Igniters

BIG SHOT™

Two Big Rockets!

BIG SHOT INCLUDES:
- Excalibur Kit
- Screaming Eagle Kit
- Powr Pad Launcher
- 4 Engines & Igniters
- Glue & Supplies
- Rocketeer's Guidebook

This fantastic starter outfit contains the same equipment you get in the Eagle Power outfit PLUS one of our tallest rockets—EXCALIBUR— a long slim "performer" standing over two feet high. Also included is our Rocketeer's Guidebook containing everything from A to Z in model rocketry and many photos and illustrations. The almost-ready-to-fly Screaming Eagle rocket is also included plus the Powr-Pad launch system and four engines. With Big Shot, you have two rockets that you can fly again and again, plus a professional launching system that really gets you established in model rocketry.

Prod. No. 5406 Skill Level 1 $21.95

IT'S EASY TO START

1 2 3 4 5

R&D Tip
Kits also available separately. See pages 10 & 20.

Powr-Pad launcher featured in most outfits is also available separately. See page 40.

Centuri

ALIEN SCOUTSHIP FLYING SAUCER OUTFIT

1 2 3 4 5

FANTASTIC! A ROCKET-POWERED UFO THAT YOU CAN FLY AGAIN AND AGAIN!

UFO's are here! Think about the thrill and excitement of walking up to the launch pad with your rocket-powered flying saucer that really flies! Countdown over, the powerful Super-C engine thrusts your Alien Scoutship skyward to a surprising height. As the thrust phase ends, you watch as your saucer rolls smoothly over to begin its landing descent. And what a beautiful recovery it is—floating down on air, just like the real thing to land gently on its tripod antennas—spectacular!

Construction is easy—no tools required, just white glue. "Space-glow" decals including alien emblem let your saucer glow in the dark. Embossed pre-cut fibre surfaces provide authentic realism and ultra-detail for display. Everything needed to fly (excluding glue and a 6 Volt lantern battery) is contained in this revolutionary outfit including mini-manual and our special UFO Tech Report. There ARE flying saucers and this outfit is the beginning!

Prod. No. 5205

$18.95

Skill Level 2

Realistic "no-parachute" floating recovery using aeorodynamic braking principles!

Tracks straight up with unique center fin "core-tube" stabilization system

INCLUDES:

- Flying Saucer
- Powr-Pad Launcher
- 3 Engines + Igniters
- Mini-Manual
- UFO Tech Report

Touches down on sturdy tripod antenna legs!

R&D Tip

Flying Saucer kit also available separately. See page 18

(Battery not included)

Centuri

NASA SPACE SHUTTLE COLUMBIA™ OUTFIT

1 2 3 4 5

R&D Tip

Kit also available separately. See pg. 21.

FLY YOURS WHEN NASA FLIES THEIRS!

Start your own Space Program with Centuri's Space Shuttle COLUMBIA Outfit. The easy to build kit is a sport-scale model of NASA's Columbia Orbiter, scheduled for first launch in 1981.

Picture yourself ready to launch your fully prepped COLUMBIA: countdown, ignition, liftoff, roaring skyward . . . ejection! The big 16" chute brings her back safely, in realistic glide position, ready to be flown again!

Complete Starter Set (less battery) has everything for your first three thrilling flights. The COLUMBIA, at nearly one foot long, is a great display model between missions! Get into rocketry with Centuri's only outfit featuring a scale-type model of a real spaceship!

Prod. No. 5206

$15.95

Skill Level 1

INCLUDES:

- Columbia Kit
- Powr-Pad Launcher
- 3 Engines and Igniters
- Supplies
- Tech Data
- Mini-Manual

America's Newest Spaceship!

KWIK KITS™

1 2 3 4 5

THESE 3 KITS ALL FEATURE:

- No sanding or sealing
- Pre-colored parts
- Molded single unit fins
- White body tubes
- Colorful stick-on decals
- All you need is white glue, scissors, and pencil

ALMOST READY TO FLY!

RECOMMENDED ENGINES LISTED ON PAGE 38

Screaming Eagle

THE WINNER!

Our easiest-to-build, and most popular rocket, "EAGLE," comes with all parts pre-formed and pre-colored including shiny chrome stick-on decals. It's a real performer, too, with flights to over 1,200 feet, using "C" engines. Includes complete plastic tail and fin section, colored body wrapper, plastic nose cone, engine lock and colorful recovery chute. Ideal for the beginner or group projects.

Prod. No. 5173 **$3.75**

SPECIFICATIONS
Length 16.4" (41.7cm)
Body Diam. 0.91" (2.3cm)
Net Wt. 1.6oz (45.4g)

Skill Level 1

SPECIAL ITEMS:
Phoenix Bird replacement parts.
#5466 PNC-136 cone $1.50
#5467 F-413L fin unit $1.50

SPECIFICATIONS
Length 26.3" (66.8cm)
Body Diam. 1.34" (3.4cm)
Net Wt. 3.4oz (96.4g)

Phoenix Bird

OVER 2 FEET LONG!

The perfect big kit for the beginning rocketeer. Simple, quick construction gets Phoenix Bird to the launch pad in a hurry. Over two feet long, everything about Phoenix Bird is BIG including its 20" recovery chute. Watch a lift-off that is slow and spectacular followed by a high flight and gentle recovery. Great for demos and displays.

Prod. No. 5407 **$8.00** Skill Level 1

2 BIG PARACHUTES!

Research rocket styled after the Air Force X-17. Two different plastic nose cones and dual recovery chutes make this rocket an exciting beginners' kit. Pre-colored parts and colorful decals give Argus a scale-like appearance. Over 28" tall, Argus streaks smoothly skyward and recovers ever so gently with two big parachutes. Extra-easy to assemble with molded one-piece plastic tail cone and fins. No tools or measuring—just glue together and be in the air in less than an hour.

SPECIFICATIONS
Length 28.5" (72.4cm)
Body Diam. 1.34" (3.4cm)
Net Wt. 3.0oz (85.1g)

Skill Level 2

Argus

Prod. No. 5039 **$9.00**

IT'S EASY TO GET STARTED WITH Centuri

BEGINNER KITS

1 2 3 4 5

Astro 1

IDEAL BEGINNER'S KIT!

Quickly assembled and easily flown, Astro-1 is our ideal beginners' rocket. An extremely clean design, this classic rocket is stable and fully capable of high altitude flights. Watch Astro zoom smoothly off the launch pad and return softly under its bright parachute canopy. Pre-cut fins, a rugged plastic nose cone, colorful decals, quick-change engine lock included.

Prod. No. 5047 **$5.00**

SPECIFICATIONS
Length 16" (40.6cm)
Body Diam. 1.04" (2.6cm)
Net Wt. 1.1oz (31.2g)

Skill Level 1

R&D Tip
A good first model for chute duration.

Micron FLIGHTS TO 1500 FEET!

Micron is extra-easy to build and has big single-stage performance due to its light weight. Colorful streamer recovery gives a soft, safe landing. Printed fins and a plastic nose cone plus roll pattern decals make Micron a standout on the launch pad. A great first or second kit that promises real excitement and fun.

Prod. No. 5005 **$3.50**

SPECIFICATIONS
Length 8.5" (21.6cm)
Body Diam. 0.76" (1.9cm)
Net Wt. 0.4oz (11.4g)

Skill Level 1

Viking

LEAST EXPENSIVE!

Prod. No. 5440 **$1.75**

Skill Level 1

Details are on page 35.

Sky Devil

CUSTOMIZED FINS!

You can select from 8 exotic fin shapes to customize this high performer—Aero Bee-Hi, Raked Delta, Swept Delta, Bastille, Swept-Subsonic or Elliptical. Clean low-drag design plus low weight makes for terrific performance with flights up to 1,800 feet! Comes with plastic nose cone, tail fin pattern sheet and colorful recovery chute.

Prod. No. 5040 **$2.75**

SPECIFICATIONS
Length 12" to 14" (30.5 to 35.6cm)
Body Diam. 0.76" (1.9cm)
Net Wt. 0.8oz (22.7g)

Skill Level 2

Centuri

Moonraker

POWER SEPARATION AT APOGEE!

This fast moving rocket has lots of action. It's really two ships in one that are separated by rocket retro into two parts high in the sky that tumble safely to earth. You can also change fin rakes from forward to back as you desire. Pre-cut fibre fins, rugged plastic nose cone and quick assembly and fantastic performance makes Moonraker a real favorite with beginning rocketeers.

Prod. No. 5041 **$2.00**

SPECIFICATIONS

Length	5.5" (14cm)
Body Diam.	0.76" (1.9cm)
Net Wt.	0.3oz (8.5g)

Skill Level 1

Groove Tube

UNUSUAL FIN DESIGN!

A standout at the launch pad, this different-looking bird flys straight and true, stabilized by a cluster of six "tube-type" fins! It's a large rocket, too, standing over 1½ feet tall. No balsa to sand, just glue the fin cluster to the body tube, install engine lock and parachute, paint, apply custom decals and she's ready to launch. Keep ahead of your friends with this one.

Prod. No. 5011 Skill Level 1

SPECIFICATIONS

Length	18.25" (46.4cm)
Body Diam.	0.91" (2.3cm)
Net Wt.	1.75oz (49.6g)

$5.00

Javelin

POPULAR BEGINNER'S KIT!

Especially designed for the beginning rocketeer, Javelin is a real high flyer that is ultra-easy to assemble. On lift-off, the Javelin streaks skyward hundreds of feet—almost out of sight! Kit includes body roll-pattern and fin decals, a brightly colored parachute, pre-cut balsa fins and quick-change engine lock. Great for first-time altitude flights.

Prod. No. 5091

SPECIFICATIONS

Length	12.5" (31.8cm)
Body Diam.	0.76" (1.9cm)
Net Wt.	0.6oz (17g)

Skill Level 1 **$4.00**

Lil' Herc

FEATHER WEIGHT TUMBLE RECOVERY!

Learn all about basic rocket flying principles with this easy-to-build rocket that ejects its engine after apogee and tumbles softly to earth ready for another flight! It has die-cut fins, a smooth plastic nose cone and there is no recovery system to pack. Super performance flight after flight!

Prod. No. 5001 **$2.00**

SPECIFICATIONS

Length	6.5" (16.5cm)
Body Diam.	0.76" (1.9cm)
Net Wt.	0.3oz (8.5g)

Skill Level 1

RECOMMENDED ENGINES ON PAGE 38

Starfire

AWARD WINNING!

This sleek performer set a chute duration record at the First International Rocket Championship Meet in Czechoslovakia. Starfire is designed to fly fast to extreme altitudes then float down very slowly on its big 20" chute. Or you can snap-on the 12" chute for regular flights. Comes with a special low-drag plastic nose cone, laminar flow boat tail, pre-cut fins and decals. Here's a real winner you'll want to add to your your fleet.

Prod. No. 5072

SPECIFICATIONS

Length	16" (40.6cm)
Body Diam.	0.91" (2.3cm)
Net Wt.	1oz (28.4g)

Skill Level 2

$5.50

NEW Spirit of America

ALMOST 2 FEET LONG!

This long bird is easy to build and fun to fly. A great first rocketry project, or one to add to your fleet, Spirit of America comes complete with plastic nose cone, die-cut fibre fins, decals, engine lock, and 90" brightly colored streamer for reliable recovery every time.

Prod. No. 5344 **$3.50**

SPECIFICATIONS

Length	22.7" (57.7cm)
Body Diam.	.98" (2.5cm)
Net Weight	1.4oz (39.7g)

Skill Level 1

R&D Tip

Use shorter delay engines when flying heavier payloads.

Snipe Hunter

SEE-THROUGH PAYLOAD CAPSULE!

Move up to payload rockets with this fantastic performer. Now you can launch insects or inert loads and observe the effects of high acceleration. The payload section is big and a special body reducer is used to keep the power section slim. Kit comes complete with colorful decals, a see-through clear plastic payload section, plastic nose cone, plus a large chute for soft recoveries.

Prod. No. 5043 **$4.50**

SPECIFICATIONS

Length	12.5" (31.8cm)
Body Diam.	0.76" (1.9cm)
Capsule Diam.	0.91" (2.3cm)
Net Wt.	0.85oz (24.1g)

Skill Level 2

Payloader II

STUDY ACCELERATION EFFECTS!

Sleek single-stage rocket for lofting heavier payloads. A transparent section carries the cargo to higher and higher altitudes as you increase the engine thrust. Stands over 1½ feet high. Assembles quicly with pre-cut balsa fins, plastic nose cone, clear cargo compartment and custom decals. Colorful parachute returns sealed capsule and rocket to earth safely.

Prod. No. 5080 **$5.00**

SPECIFICATIONS
Length 18.5" (47cm)
Body Diam. 1.0" (2.5cm)
Net Wt. 1.2oz (34g)

Skill Level 2

Bandito

NO SANDING OR SEALING!

Add this slim hot perfomer to your fleet for almost-out-of-sight flights! The unique wedge-shaped fibre fins (die-cut fibre) help Bandito attain maxium velocity in a hurry! Earth return is via a colorful streamer. Bright chrome trim and custom decals, quick-change engine lock and plastic nose cone complete this high performance kit.

SPECIFICATIONS
Length 15.5" (39.4cm)
Body Diam. 0.76" (1.9cm)
Net Wt. 1.5oz (42.6g)

Prod. No. 5007

$4.50

Skill Level 2

Twister

SPECIFICATIONS
Length 11" (27.9cm)
Body Diam. 0.91" (2.3cm)
Net Wt. 0.9oz (25.5g)

SPIN-STABILIZED!

This is one of our excitingly "different" beginners' rockets with flights to over 1,000 feet! On the way up, you'll see spin-stabilization in action as Twister tracks straight and true. The canted fins are specially designed to give Twister a rapid rotation. High in the sky you'll see the colored parachute "pop" free to let Twister swing slowly back to earth. Paint Twister in bright colors and watch the colors blend and change as it rotates upward. A real "fun" rocket for the beginner.

Prod. No. 5002 **$4.00**

Skill Level 1

LISTED ON PAGE 38

THUNDER™

1 2 3 4 5

LONG, LONGER, LONGEST!

THEY LOOK SIMILAR, BUT ARE LOADED WITH DIFFERENCES! CHOOSE FROM:

- 3 Sizes
- 3 Recovery Systems
- 3 Skills
- 3 Engine Mounts

All include big decals & pre-cut balsa fins.

Thunder Hawk

CENTURI'S LONGEST BEGINNER KIT!

A great performer, this sleek long Thunder Hawk is easy to build and impressive in the air with flights to 1,000 feet. Streamer recovery slows the model's descent to a gentle landing. The Thunder Hawk is ideal for beginners and a super quick kit for more advanced rocketeers.

SPECIFICATIONS
Length 21.5" (54.6cm)
Body Diam. .76" (1.9cm)
Net Wt. 1oz (28g)

Prod. No. 5338

$3.00

Skill Level 1

NEARLY 2 FEET LONG!

A FULL 3½ FEET LONG!

Thunder Bird

BIG, EASY & IMPRESSIVE!

A great demo bird, the long, thin Thunder Bird is recovered by a large 20" parachute. Two-piece body assembles quickly and easily. Add this big bird to your fleet today!

SPECIFICATIONS
Length 41.75" (106cm)
Body Diam. 1.0" (2.5cm)
Net Wt. 2.7oz (77g)

Prod. No. 5339

$6.00

Skill Level 2

OVER 5 FEET LONG!

CONVERTIBLE & MAGNUM-D See Engine Section

Thunder Roc

THE ULTIMATE LONG ROCKET!

Biggest kit in the Centuri line, Thunder Roc lumbers off the pad under Super-C power. Or, remove the convertible engine mount and fly it with a D engine! Two 16" parachutes bring the big bird back for another exciting flight.

Prod. No. 5340 **$9.00**

Skill Level 3

SPECIFICATION
Length 61.5" (156.2cm)
Body Diam. 1.64" (4.2cm)
Net Wt. 6.6oz (187g)

Centuri

1 2 3 4 5

SUPER KITS™

Definitely different. Super Kits are out of this world both in appearance and size. These are BIG rockets with special missions. EACH KIT INCLUDES–

- Big 6" x 12" 4-color super detailed decal
- Baffle/chute ejection system*
- Rocket Rack display stand
- Dual-chute recovery
- Pre-shaped fins
- Engine Lock

*U.S. Pat. No. 3,719,145

S.S.V. Scorpion SATELLITE REPAIRSHIP

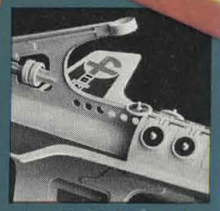
SPECIFICATIONS

Length	29.7" (75.4cm)
Net Wt.	5.7oz (161.6g)
Fin Span	8.6" (21.8cm)
Diam.	2.0" (5.1cm)

Skill Level 3

This exotic ship's job is to recover, repair and launch earth-circling solar energy collecting satellites. Cruising at over 15,000 mph, Scorpion collects satellites using a magnetic stinger-shaped rudder and stows them in special hull slots for later repair. A member of the Satellite Service Vehicle (S.S.V.) fleet, Scorpion performs a vital role in conserving the natural resources of earth in the 21st century.

Prod. No. 5307 **$13.95**


Exotic Hull Details

E.S.S. Raven SCIENCE FLAGSHIP

Raven is the flagship of the Earth Science Service (E.S.S.), an international organization devoted to sampling and testing the earth's ozone layer. Designed to fly to the limits of the atmosphere and return for a winged landing, Raven's dual bottom scoop takes in air samples for onboard computer analysis. Sleek and fast, Raven employs the recently announced faster-than-light propulsion system.

Prod. No. 5312 **$13.95**

SPECIFICATIONS

Length	30.5" (77.5cm)
Net Wt.	5.3oz (150g)
Fin Span	10.5" (26.7cm)
Diam.	1.6" (4.1cm)

Skill Level 3

Collector Scoop Details

RECOMMENDED ENGINES LISTED ON PAGE 38

BIG ON SIZE & PERFORMANCE & FANTASTICALLY DETAILED SUPER KITS™

R&D Tip
The Rocket Rack included in every Super Kit is also available separately for displaying your other models. See parts section.

Realistic Ramjet Detail

U.S.S. America PRESIDENTIAL COMMAND POST

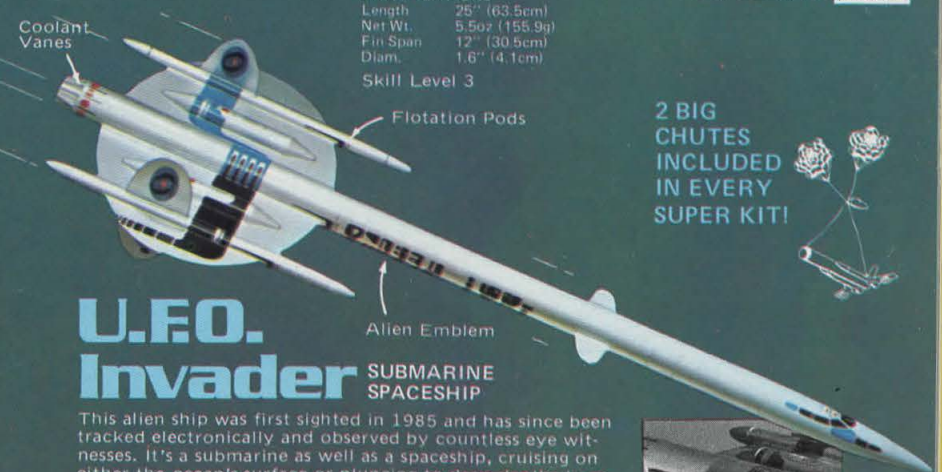
Thundering aloft for the first time in 1988, U.S.S. America serves as a Presidential Command Post and operational center. Able to operate in outer space or within the earth's atmosphere, America helps maintain peace on earth as well as in space. Three large nuclear engines plus six ramjets power this advanced technology giant.

Prod. No. 5310 **$13.95**

SPECIFICATIONS

Length	25" (63.5cm)
Net Wt.	5.5oz (155.9g)
Fin Span	12" (30.5cm)
Diam.	1.6" (4.1cm)

Skill Level 3



2 BIG CHUTES INCLUDED IN EVERY SUPER KIT!

U.F.O. Invader SUBMARINE SPACESHIP

This alien ship was first sighted in 1985 and has since been tracked electronically and observed by countless eye witnesses. It's a submarine as well as a spaceship, cruising on either the ocean's surface or plunging to deep depths to escape detection. Its circular wing-plan has sometimes been mistaken for a flying saucer and rumors are that it employs a fuel-less magnetic drive force as yet unknown to us.

Prod. No. 5308 **$13.95**

SPECIFICATIONS

Length	30" (76.2cm)
Net Wt.	4.7oz (133g)
Fin Span	9.3" (23.6cm)
Diam.	1.34" (3.4cm)

Skill Level 3

Disc and Pod Detail

1 2 3 4 5

Centuri SCIENCE FICTION KITS IN YOUR FUTURE

- No tools required—just white glue!
- Space-glow alien emblem decals "glow" in the dark!
- High-detail embossed surfaces!
- All parts pre-colored & pre-shaped!
- Fits any launcher!
- Sturdy lightweight fibre construction!

ALIEN SCOUTSHIP!

Flying Saucer

This model UFO really flies! Design based on reported sightings. Watch it rise smoothly off the launch pad and streak to surprising altitudes. As coast phase ends, saucer rolls over and starts an eerie descent, floating softly down on a cushion of air. Lands on sturdy outspread aerial/tripod legs! No chute to pack, just re-engine and go again! Be the first in your neighborhood to fly this amazing performer. Great for display too!

Prod. No. 5325

$6.50

SPECIFICATIONS

Diam.	9.125" (23.2cm)
Height	3.5" (8.9cm)
Net Wt.	2.4oz (68g)

Skill Level 2

RECOMMENDED ENGINES LISTED ON PAGE 38

Prod. No. 5033

Taurus $7.95

2 FOOT LONG DEEP-SPACE CRUISER!

This interstellar visitor has the look of the future. It is one of our most popular detailed kits that you will be proud to fly or display. Taurus stands over 2 feet tall on the launch pad and thunders aloft to recover gently under a large parachute. Here's what you get: plastic body reducers, extra large molded nose cone, simulated cluster boosters, shiny chrome trim, pre-cut fins, Taurian decals, and illustrated science-fiction story.

SPECIFICATIONS

Length	23.3" (59.2cm)
Body Diam.	1.34" (3.4cm)
Net Wt.	2.6oz (73.7g)

Skill Level 3

SPECIFICATIONS

Length	21.5" (54.6cm)
Body Diam.	1.34" (3.4cm)
Net Wt.	1.75oz (49.6g)

Skill Level 3

Laser X

SPACE PROBE!

LASER-X is based on planet Earth and is designed around U.S. technology. Atop the large simulated booster section sits a slim rocket body aimed at the stars. Ultra-stable due to extra large booster fins, Laser-X moves smoothly off the launch pad to surprising heights. Pre-cut fins, large chute, body reducer and a big decal sheet loaded with customizing ideas are all included.

Prod. No. 5110 $7.00

Skill Level 4

Sky-Lab

SPECIFICATIONS

Length	24.5" (62.23cm)
Body Diam.	2.04" (5.2cm)
Net Wt.	3.4oz (96.4g)

INSPIRED BY NASA'S SPACE STATION!

Suspended in the blackness of space, moving thousands of miles per hour and rotating slowly, Sky-Lab monitors important Earth resources. The space exploration age is here with NASA's flying laboratory. Every detail is included in this spectacular kit. Shiny solar panels, ultra-detailed plastic parts, body wrapper, huge decal sheet, plastic cones and more. Watch the slow lift-off as your Sky-Lab thunders skyward to return gently, suspended by an extra large chute.

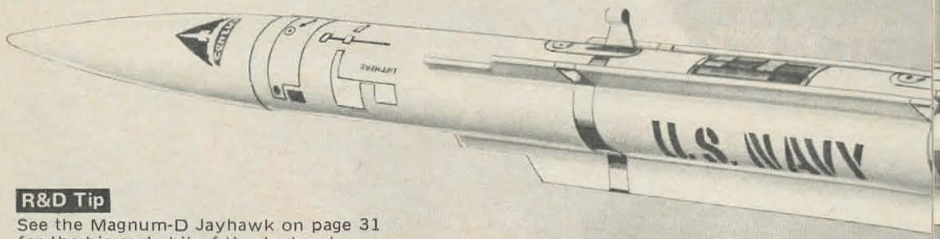
Prod. No. 5034

$11.95

Centuri SPORT-SCALE KITS

THESE LOOK LIKE THE REALTHING!

1 2 3 4 5



R&D Tip

See the Magnum-D Jayhawk on page 31 for the big scale kit of the Jayhawk.

Jayhawk

TARGET DRONE ACTION!

Looks and flys just like the U.S. Navy's AQM-37A missile target drone! High detailing with our big 3-color decal sheet really sets Jayhawk apart. Includes pre-cut fibre "wing," "rudder" and forward "canard" fins plus molded plastic nose cone, parachute, and boat tail. Add decal, and Jayhawk is ready for duty.

SPECIFICATIONS
Length 12.6" (32cm)
Body Diam. 0.91" (2.3cm)
Net Wt. 1oz (28.4g)

Prod. No. 5171 **$4.50**

Skill Level 2

Excalibur

OVER 2 FEET LONG! SLEEK AND QUICK!

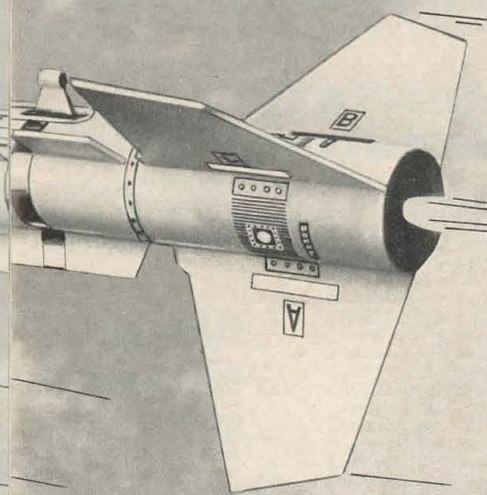
Excellent big rocket for the beginner! Over 2 feet long! Excalibur has the sleek lines of a real research rocket yet goes together fast and easy. Features plastic nose cone and body reducer, die-cut smooth fibre fins and the option to customize the upper portion as a payload carrier. Bright reflective chrome trim, large custom decal and big recovery chute finish of this spectacular hi-flier!

SPECIFICATIONS
Length 26.5" (67.3cm)
Body Diam. 0.91" (2.3cm)
Net Wt. 1.60oz (45.4g)

Prod. No. 5008 **$6.00**

Skill Level 1

RECOMMENDED ENGINES LISTED ON PAGE 38



Nomad

SUPER DETAILED!

Looks just as authentic as a U.S. Navy missile. This kit has everything you need to detail it right down to the access hatches—even the launch attachment lugs resemble a real missile's. Very impressive on the launch pad, Nomad streaks to high altitudes and recovers by parachute. Die-cut fins and body vanes, shiny chrome bands, a big 2-color decal sheet, and engine lock make Nomad a knockout.

SPECIFICATIONS
Length 18.0" (45.7cm)
Body Diam. 1.0" (2.5cm)
Net Wt. 1.75oz (49.6g)

Prod. No. 5035

$6.00

Skill Level 3

AMERICA'S NEWEST SPACESHIP!

This fun Centuri kit is engineered with the real shuttle's shapes simplified for fast assembly and reliable flights, just like our popular Fighter Fleet rocket-jets!

Build the Columbia kit from its all pre-shaped parts, including sturdy die-cut fibre-fins, molded plastic nose cone, cockpit and display nozzles. You easily assemble with white glue and plastic cement, then spray paint it white. Apply the handsome red, blue, black & grey decals from the huge stick-on sheet supplied. Your flight features include an engine lock and big 16" chute for bringing Columbia back gently, posed in realistic horizontal position. Your kit also includes Tech Data and photos of the real Columbia, plus realistic triple engine nozzles for displaying her between missions.

SPECIFICATIONS
Length 11.3" (28.7cm)
Body Diam. 1.64" (4.2cm)
Net Wt. 2.45oz (68.6g)

Prod. No. 5343

$5.50

Skill Level 1

Centuri

SUPER SCALE KITS

EXCITING SCALE REALISM THAT FLYS!

1 2 3 4 5

RECOMMENDED ENGINES LISTED ON PAGE 38

Saturn 1B

1/100 SCALE OF FIRST APOLLO MANNED MISSION VEHICLE

Apollo 7 rose off the launch pad at 11:03 A.M., October 11, 1968, carrying three astronauts first into blue Florida skies and then the blackness of space. The 10-day flight paved the way for the first moon-circling flight.

Unbelievable details right down to the space capsule plus corrugated body wrapper panels, rocket engine nozzles, and the exact markings of the real ship makes Centuri's Saturn 1B a flying scale masterpiece of man's first reach toward the stars. The model is over 2 feet tall and lifts off beautifully on a 2-engine cluster for a dual chute return. Historical booklet and many pre-molded parts make this one a "must" for every rocketeer.

Prod. No. 5140

$19.95

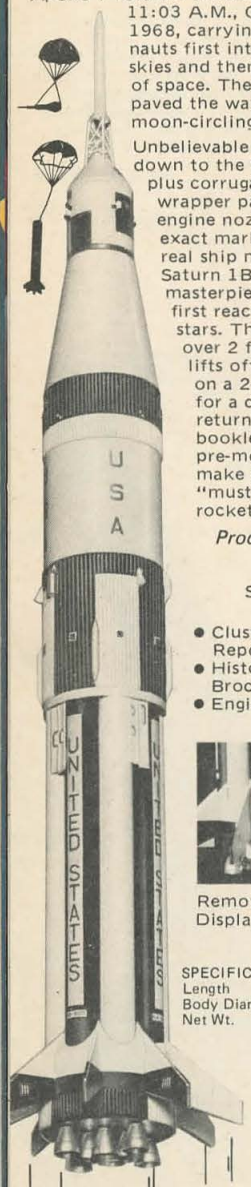
Skill Level 5

- Clustering Report
- Historical Brochure
- Engine Locks

Removable Display Nozzles

SPECIFICATIONS

Length	26.8" (68.1cm)
Body Diam.	2.62" (6.65cm)
Net Wt.	4.4oz (124.7g)



DUAL ENGINES! OVER 2 FEET LONG!

Mercury Redstone

*U.S. Pat. No. 3,719,145

FIRST U.S. MANNED SPACE FLIGHT ROCKET

in 1961, NASA's Freedom 7 with Alan Shepard at the controls flew higher and faster than any American before—116 miles up at over 5,000 mph! Shepard's flight was 15 minutes in duration and covered 303 miles—a "first in space" for the U.S.A.! Centuri's model of this historical flight is a true 1/36th scale, with absolutely accurate details including the Mercury capsule and escape tower molded of tough styrene plastic. Big, slow lift-off looks just like the real thing. Die-cut fins, big 3-color decal sheet, historical data brochure, dual-chute recovery plus high altitude flights make this historical event come alive again on your launch pad!

Prod. No. 5131

$11.95

Skill Level 5

- Engine Lock
- Baffle Ejection*
- Pull Away Lugs

SPECIFICATIONS

Length	29" (73.7cm)
Body Diam.	2.04" (5.2cm)
Net Wt.	3.7oz (104.9g)

SUPER DETAIL! NEARLY 2½ FEET!

Nike Smoke

REPLICA OF NASA WEATHER RESEARCH ROCKET

A very high flyer and easy to build, this perfectly scaled model stands almost 2 feet tall with a long tapered plastic nose cone. Features unique baffle ejection* system, large parachute, authentic markings decal sheet, pre-cut balsa fins and technical data sheet. Build and fly the same day!

Prod. No. 5145

$6.95

Skill Level 2

- Lug Mounts
- Engine Lock

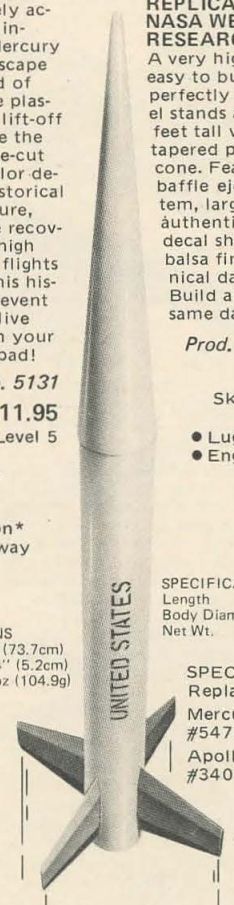
SPECIFICATIONS

Length	23.7" (60.2cm)
Body Diam.	1.64" (4.2cm)
Net Wt.	2.3oz (65.2g)

SPECIAL ITEMS: Replacement parts.

Mercury Capsule #5477 $2.50

Apollo Capsule #34090 $1.50



R&D Tip

Easiest way to ge into Super Scale.

ACCURATE 1/10 SCALE! 2 FEET LONG!

America went interplanetary with the flight of Apollo 8 when the big Saturn 5 thundered off the launch pad on December 21, 1968. This famous Centuri model rocket is acknowledged as the world's most detailed flying replica of the histrocial "man to the moon" rocket. This 3½ ft. giant performs as beautifully as it looks, using 3-engine cluster power, coasting upward to apogee to deploy 2 chutes for body recovery and one large chute for an ever-so-gentle return of its space capsule. Scaled in detail from NASA blueprints, including numerous plastic detailed parts, Saturn 5 is truly a collectors item that every serious rocketeer will want to own.

R&D Tip

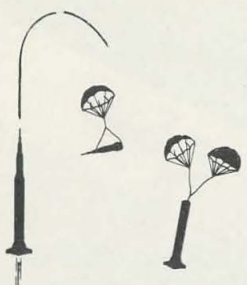
Use 3 C5-3S engines for high flights. Requires 12V battery and heavy duty launcher (Power Tower, Powr-Control and Heavy Duty Rod.

Or use one MAGNUM-D D12-3 (and a EM-916 mount) for single engine reliability. 12V battery not required, but launcher with heavy duty rod still required.

Prod. No. 5142

$34.95

Skill Level 5



- Engine Locks
- Accurate Decals
- Clay Weight
- Painting Tips
- Hollow Fins

THREE-ENGINE LAUNCH!

Tech report included on clustering. Super C engines put the big bird higher than ever!

F-1 Engine Nozzle Bells Are Removable For Flight

All-Plastic Apollo Capsule and Tower

Pre-formed Exact-scale Corrugated Body Panels

Apollo Saturn V

Skill Level 5

SCALE SPACE GIANT!

THE "ULTIMATE ADVENTURE" IN SCALE FLYING ROCKETRY FOR ALL AGES!

OVER 3½ FEET LONG!

SPECIFICATIONS

Length	43.6" (110.7cm)
Body Diam.	3.96" (10.1cm)
Net Wt.	9.2oz (260.8g)

SPECTACULAR!

12 page historical brochure with many photos included with both Saturns.

Centuri

STRIKE FORCE™ KITS FROM TODAY'S HEADLINES

RECOMMENDED ENGINES LISTED ON PAGE 38

CAMOUFLAGE PARACHUTE
Featured in: Gabriel, Sam-3, Sea Killer

Israeli
Gabriel
TACTICAL MISSILE

A surface-to-surface missile, Centuri's Gabriel is a realistic flying model rocket of the real ship-launched missile from pointed nose to boxy guidance fins. Authentic Israeli military insignia and markings plus super body detail decals make Gabriel impressive on the launch pad and a great display model. Balsa nose cone, pre-cut balsa fins, easy-to-follow instructions, and a missile technical data folder complete the package. Launch to altitudes of over 1,000' using the Big "C" engine and watch the big 14" camouflage parachute blossom for a safe return.

SPECIFICATIONS
Length 14.25" (36.2cm)
Body Diam. .908" (2.3cm)
Net Wt. 1.4oz (39.7g)

Prod. No. 5333 **$5.50**

Skill Level 3

Russian
Sam-3
TACTICAL MISSILE

A modified scale version of the famous Russian Surface-to-Surface Missile normally used against aircraft. Booster tail section looks authentic in detail yet flight requires only a single C engine for altitudes of over 1,000 feet! Camouflage the missile in dull greys and blues, then detail it with insignia plus authentic markings and you have a beautiful scale-like high flyer that recovers on its own camouflaged parachute. Round out your tactical missile fleet with SAM3!

SPECIFICATIONS
Length 13.5" (34.3cm)
Body Diam. 1.04" (2.6cm)
Net Wt. 1.2oz (34g)

Prod. No. 5332 **$5.50**

Skill Level 3

STRIKE FORCE™

1 2 3 4 5

Each Tactical Missile features
- Camouflage Chute
- 2-color Decals
- Body Detailing Strips
- Balsa Fins
- Data Sheet
- Balsa Cone

Get into international rockets with Centuri's "Strike Force" kits . . . military missiles from around the world. The Cruise Missile is a highly accurate scale model. The others are Tactical Missiles of near-scale realism, modified for model rocketry.

Boeing A.L.C.M.
Cruise Missile

Now you can fly a rocket-powered model of America's most potent strategic weapon! The Boeing Cruise Missile is aircraft launched and streaks thousands of miles deep into enemy territory, flying at tree-top level. The real missile is jet-powered, flys on thin swept wings, and is radar-guided with pin-point target accuracy. Imagine the thrill of launching this very realistic model. Poised on the launch pad with its wings folded, it streaks straight up to unbelievable heights and floats gently back to earth, swinging from a big 16" chute. Easy-to-assemble with a rugged blow-molded plastic body, die-cut plastic wings and fins. Big 4-color highly detailed decal sheet included. Great for display on the colorful fibre stand included.

SPECIFICATIONS
Length 12.3" (31.2cm)
Net Wt. 2.6oz (73.7g)

Prod. No. 5330 **$9.00**

Skill Level 3

R&D Tip
One of our most detailed models, yet fairly easy assembly.

Italian
Sea Killer
TACTICAL MISSILE

Styled after Italy's 25-mile range surface-to-surface ship-launched homing missile, the Sea Killer model rocket looks just like the real thing. Authentic military markings and insignia included plus balsa nose cone, pre-cut fins and new camouflaged parachute. Add the Sea Killer to your flying rocket tactical missile force today.

SPECIFICATIONS
Length 14" (35.6cm)
Body Diam. .908" (2.3cm)
Net Wt. 1.2oz (34g)

Prod. No. 5331 **$5.50**

Skill Level 3

Centuri

FIGHTER FLEET™

1 2 3 4 5

These are realistic jet fighter aircraft models you'll be proud to display and fly! All have a near-scale appearance, yet launch vertically as rockets to return safely via parachute. Clean lines, super detail and authentic markings make Fighter Fleet a must for every rocketeer!

EACH KIT INCLUDES:

- Clear Canopy
- Cockpit Decals
- Missiles
- Fuel Pods
- Pre-Cut Fibre Fins
- 4-Color Decals
- Horizontal Chute Recovery
- Data Sheet With Specs
- Scale Info On Real Fighter
- Engine Lock

KITS ROCKET-JETS THAT FLY!

RECOMMENDED ENGINES LISTED ON PAGE 38

Clockwise from top:

5J Israeli Mirage THE LEGEND!

Prod. No. 5321 **$6.95**

SPECIFICATIONS

Length	14.1" (35.8cm)
Body Diam.	1" (2.5cm)
Span	6.9" (17.5cm)
Net Wt.	2.3oz (65.2g)

Skill Level 3

A French-built Dassault aircraft, the delta-winged Mirage is the mainstay of the Israeli Air Force performing a variety of missions as a fighter/interceptor and close air support missions. Light and fast (Mach 2), the 5J can haul a wide variety of ordinance including missiles, bombs, and rockets. Camouflage yours to match the desert and watch it streak almost out-of-sight to return softly by chute.

F-4 Phantom ACE VETERAN!

Prod. No. 5319 **$6.95**

SPECIFICATIONS

Length	14.5" (36.8cm)
Body Diam.	1" (2.5cm)
Span	8.5" (21.6cm)
Net Wt.	2.3oz (65.2g)

Skill Level 3

One of the most versatile fighters in the world, the F-4 is used by the Navy, Marines, and Air Force plus Canada and Great Britain. Extremely fast at Mach 2.2, the F-4 flys as a fighter or bomber and can carry up to 16,000 lbs. of bombs plus "Sidewinder" and Sparrow missiles. Put this one on the pad and get ready for action!

F-15 Eagle HIGH-TECH JET!

Prod. No. 5318 **$6.95**

SPECIFICATIONS

Length	15.7" (39.9cm)
Body Diam.	1" (2.5cm)
Span	7.7" (19.6cm)
Net Wt.	2.1oz (59.5g)

Skill Level 3

The USAF Air Superiority dual-engine fighter that slices through the air at two and one-half times the speed of sound! During flight tests, the F-15 broke all existing world climbing records. It's a large fighter but comparatively light in weight due to new ultra-light space-age metals. All markings are authentic right down to the refueling hatches. Get airborne with this top performer.

F-104 Starfighter PRIDE OF NATO!

Prod. No. 5320 **$6.95**

SPECIFICATIONS

Length	15.0" (38.1cm)
Body Diam.	1" (2.5cm)
Span	6.7" (17cm)
Net Wt.	2.0oz (56.7g)

Skill Level 3

Currently in NATO service, the Lockheed F-104 is the world's first operational fighter to sustain a speed of Mach 2. Extremely small and razor-thin wings carry carry two heat-seeking "Sidewinder" missiles. The actual wing span of the real fighter is only 22 feet! Comes with authentic German Air Force markings.

F-16 Fighter NEW SUPER-JET!

Prod. No. 5317 **$6.95**

SPECIFICATIONS

Length	15" (38.1cm)
Body Diam.	1" (2.5cm)
Span	7" (17.8cm)
Net Wt.	2.0oz (56.7g)

Skill Level 2

The USAF basic Air Combat fighter of the 1980's, F-16 flys over the speed of sound. It's armed with two AIM-9 missiles plus 20mm cannon. The model comes with official USAF markings and quick-change engine lock. Ventral fins provide smooth vertical flights. An easy fly-in-one-afternoon project.

EXTRA-HI FLYING

1 2 3 4 5

MULTI-STAGE KITS

Centuri

JOIN THE HIGH FLYING FUN— GO MULTI-STAGE!

ACTION GALORE! Watch Centuri's exclusive pass-port staging* in action on all multi-stagers. The next stage is ignited as the expended stage is smoothly released to tumble safely to earth.

*U.S. Pat. No. 3,721,193

R&D Tip
See Flight Manual F:8
Try "Super-C" boosters (C5-0S) for best performance

Arrow 300

BIG 3-STAGE ACTION!
This slim multi-stager measures over 3 feet long! An ultra-high performer, Arrow 300 streaks to altitudes of over ½ mile. Single, dual, or three-stage flights are possible. Large "United States" decal and 1-2-3 fin decals detail this big bird. Comes with long nose cone, precut fibre fins, 12" recovery chute, and a payload section. Here's real action for the experienced rocketeer!

Prod. No. 5037

$9.50

SPECIFICATIONS
Length 37.7" (95.8cm)
Body Diam. 0.91" (2.3cm)
Net Wt. 2.5oz (70.9g)

Skill Level 4

R&D Tip
Centuri's highest flier when launched with C's.

Long Tom

3 FEET LONG!
Get up high with this one! Poised skyward on the launch pad this long, slender rocket flys as fast as it looks. Colored plastic body reducer and nose cone, big decal sheet, exclusive baffle/chute ejection* (no chute wadding required) and parachute recovery makes Long Tom extra easy to build and fun to fly.

Prod. No. 5064

$9.50

SPECIFICATIONS
Length 35.5" (90.2cm)
Body Diam. 1.34" (3.4cm)
Net Wt. 3oz (85g)

Skill Level 4

*U.S. Pat. No. 3,719,145

Excalibur 2

LONG & EASY!
A favorite 2-stager with a military look. Forward dorsal fins add stability and flight realism. Complete with body decal sheet, molded cone end and body reducer and a large chute. Watch two smooth stages of thrust push Excalibur 2 high into the blue.

$7.00 *Prod. No. 5175*

SPECIFICATIONS
Length 29.5" (72.4cm)
Max. Diam. 0.91" (2.3cm)
Net Wt. 2.1oz (59.5g)

Skill Level 3

Stiletto

THE HIGHER FLYER!
Long and extremely thin with sharply swept body fins, Stiletto slices upward to reach altitudes of over 1,800 feet! A colorful drogue streamer recovery system helps keep Stiletto "visual" on the long way down as the big booster tumbles safely to earth. Die-cut fins, custom decal, and detailed staging technical report completes this hi-flying package of excitement.

Prod. No. 5031 **$5.50**

SPECIFICATIONS
Length 18.25" (46.4cm)
Body Diam. 0.76" (1.9cm)
Net Wt. 1.1oz (31.2g)

Skill Level 3

Black Widow

THE BOOSTER GLIDES!
A good one to get started in staging and a hi-flier too—over 1,600 feet! Unique booster has extra-large fins, for a sweeping glide recovery. Comes with plastic nose cone, special decals, pass-port staging system, and large chute.

Prod. No. 5036

$6.95

Skill Level 5

SPECIFICATIONS
Length 15" (38cm)
Body Diam. 0.76" (1.9cm)
Net Wt. 1.2oz (34g)

R&D Tip
Hand launch and trim booster as if it were a B/G.

R&D Tip
Top stages of all Centuri multi-stages may be flown alone as regular model rockets.

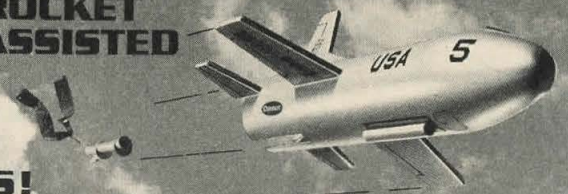
RECOMMENDED ENGINES LISTED ON PAGE 38

Centuri

1 2 3 4 5

BOOST GLIDER KITS

ROCKET ASSISTED GLIDERS THAT RETURN ON WINGS!



HISTORICAL! Based on old NASA designs, before the real Space Shuttles!

Space Shuttle

FLY NASA'S ORIGINAL CONCEPT!

One of Centuri's most spectacular kits! Both booster ship and piggyback shuttle glide back to earth after separating at apogee while the rocket booster pod returns separately by streamer. Detailed decal sheet with authentic markings, plastic cones, pre-cut balsa wings and fins plus spec sheet on the real ship make "Shuttle" a space-age project you'll not want to miss!

Prod. No. 5066 **$10.95**

SPECIFICATIONS

	Booster Ship	Shuttle Ship
Length	15" (38cm)	9.5" (24cm)
Body Diam.	1.64" (4.2cm)	1.34" (3.4cm)
Net Wt.	2.20oz (62g)	.85oz (24g)

Skill Level 5

SST Shuttle

BIG DUAL SHIP ACTION!

Watch this long bird lift-off smoothly and streak high in the air. At apogee the glider detaches and begins a long flight back to earth. Meanwhile, the slender SST deploys a large chute for a soft horizontal recovery. Kit includes a big decal sheet and many pre-formed plastic parts for ultra-realism. SST is a challenging project laoded with detailed instructions including "SST Concepts Report". Fly it with the new Super-C engines for "extra high" adventure!

Prod. No. 5077 **$10.95**

SPECIFICATIONS

	SST	GLIDER
Length	22.5" (57.2cm)	8.5" (21.6cm)
Body Diam.	1.04" (26cm)	0.76" (1.9cm)
Net Wt.	2oz (56.7g)	.6oz (17g)

Skill Level 5

RECOMMENDED ENGINES LISTED ON PAGE 38

1 2 3 4 5

MAGNUM-D™

MOVE UP IN ROCKETRY!

Centuri's Magnum-D engines open new opportunities to the model rocketeer. This powerful engine permits the design of larger rockets, without clustering or staging. One Magnum-D is equal in power to two C engines, or four B engines.

MAGNUM-D™

Jayhawk

AWARD WINNING DESIGN!

Spectacular 1/5 scale model of the U.S. Navy's AQM-37A target drone, probably the prettiest U.S. missile ever. This massive rocket is over 30 inches long . . . it's impressive on the pad and in the air. Fantastically detailed, a challenge for all modelers. Special features include molded plastic nose cone, huge pre-cut balsa sheets and 112 sq. inch decal sheet (almost a square foot!) printed in five bold colors. Magnum-D power gives it quite a ride, and two 20 inch parachutes brings it safely to earth, ready for another flight. Designed for the advanced model rocketeer, this kit is a model you'll be extra proud to display and fly.

SPECIFICATIONS

Length	30.4" (77.22cm)
Body Diam.	2.6" (6.6cm)
Net Wt.	9.21oz (261g)

Skill Level 5

Prod. No. 5342

$14.95

Recommend using with heavy duty rod.

INCLUDES BIG SCALE DATA BOOKLET ABOUT THE REAL JAYHAWK

BONUS

MAGNUM-D™

Hornet

Skill Level 2

Prod. No. 5341

$4.00

SLEEK & SWIFT FLYER!

You and your friends will marvel at how fast the sleek Hornet moves off the pad under Magnum-D power! Easy to build, the Hornet makes an excellent first "D" kit. Plastic nose cone, snappy decal, pre-cut balsa fins and long 90" streamer recovery make Hornet fun to build and fly.

Insert the easily assembled D-convertible mount and fly it with regular Enerjet engines too! Get into D's today with the Hornet.

CONVERTIBLE™

SPECIFICATIONS

Length	19.8" (50.3cm)
Body Diam.	1.325" (3.4cm)
Net Wt.	1.76oz (49.28g)

Centuri

3 NEW BONUS PACK KITS

MAGNUM-D™

SR-71 Blackbird

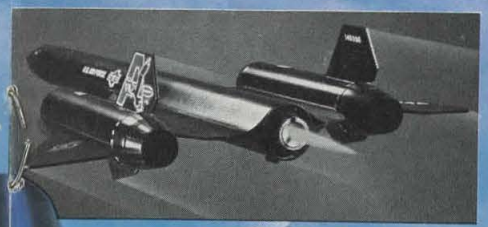
HUGE U.S.A.F. SPY PLANE

The SR-71 is the Air Force's long-range advanced strategic reconnaissance aircraft capable of flying above 80,000 feet at 3 times the speed of sound! It carries a variety of advanced observation equipment which can survey 30 miles wide and 2,000 miles long in one hour. Centuri's sport-scale model is D-convertible. Includes five large molded plastic parts, embossed body panels, balsa wings and rudders and parachute recovery. Realistic decal sheet lets you finish the model in authentic Air Force insignia and markings.

SPECIFICATIONS
Length 27.5" (69.8cm)
Body Diam. 1.64" (4.2cm)
Net Weight 6.6oz (187g)

Skill Level 3 *Prod. No. 5349*
$10.95

CONVERTIBLE™



Includes Display Stand Kit

INCLUDES FREE MAGNUM-D ENGINE! BONUS TYPE: D12-7 & IGNITER

INCLUDES FREE MAGNUM-D ENGINE! BONUS TYPE: D12-5 & IGNITER

MAGNUM-D™

Tomahawk

U.S. NAVY CRUISE MISSILE

The Tomahawk, developed by General Dynamics is designed to be launched from a variety of vehicles, including submarines and trucks, then streak over enemy terrain at tree-top level, under radar surveillance, to its target. Centuri's sport-scale model of the Tomahawk features die-cut balsa fins and large molded nose and tail cones. Huge decal sheet makes this red, white & blue beauty sparkle on the realistic display stand included. Tomahawk includes parachute recovery and D-convertible engine mount.

CONVERTIBLE™

SPECIFICATIONS
Length 22.75" (57.8cm)
Body Diam. 2.2" (5.6cm)
Net Weight 3.6oz (102g)

Skill Level 3
Prod. No. 5352
$9.95

INCLUDES FREE ENERJET ENGINE BONUS TYPE: C6-5 & IGNITER

Space master

STRATEGIC TROOP CARRIER

The Spacemaster is the workhorse of space transports in the near future. An updated version of the smaller and earlier "Galaxy", the Spacemaster can transport up to 100 men and equipment to distances in excess of 4 million miles without stopping for refueling. Centuri's model is nearly two feet long, and features balsa fins, plastic nose cone, quick-release engine mount and big two-color decals. Flights over 600 feet with 12" parachute recovery.

SPECIFICATIONS
Length 22.25" (56.5cm)
Body Diam. .976" (2.5cm)
Net Weight 1.4oz (40g)

Skill Level 3
Prod. No. 5348
$5.00

FREE ENGINES!

ONE INCLUDED AT NO EXTRA CHARGE!

RECOMMENDED ENGINES LISTED ON PAGE 38

TIME LIMIT!

OFFER MAY END WITHOUT NOTICE, ACT NOW!

Centuri FUN & GROWTH! **ROCKETRY**

Designer's Special

Prod. No. 5458 $17.95

NOSE CONES:
3 #7 Assorted
3 #8 Balsa &
2 #10 Plastic
BODY TUBES:
3 #7 Tubes
3 #8 Tubes
2 #10 Tubes
1 Plastic Capsule
FINS:
1 Fin Pattern Sheet
6 Balsa Fin Sheets
ENGINE SECTION:
3 Thrust Rings
5 Engine Mounts
PARACHUTES:
3 12" Chutes
3 16" Chutes
2 20" Chutes
MISCELLANEOUS:
1 #8 Connector
2 Sheets Tape Discs
1 Roll Shroud Line
8 Elastic Shock Cords
8 Shock Cord Fasteners
8 Launch Lugs
1 Flag Decal Sheet
3 Screw Eyes
1 Rocket Designer's Manual

OVER 90 PARTS!

Build 8 big rockets with this fantastic assortment of parts. Great for groups and clubs or the serious designer who
wants to go higher and faster.
Built-in 45% savings!
Design your own rockets!

VIKING 12

THE MODEL ROCKET PROJECT DESIGNED FOR YOUTH GROUPS & SCHOOLS

Painting not required! All parts pre-colored.
Or easily spray painted in distinctive colors.
From the Rocketry EXPLORATION™ Series

DOZENS OF DESIGN CHOICES FOR PERSONALIZING EACH ROCKET.

Specially shaped pre-cut fins may be glued on in any one of 24 possible configurations.

1 2 3 4 5

EXPLORATION

Also see page 47 for the Rocketry EXPLORATION™ Power System Outfit

ATTENTION, GROUP LEADERS: For volume purchasing info and sample Leader's Guide, write on your organizations letterhead to: Centuri/Viking, Dept. 829, Box 1988, Phoenix, AZ 85001

Flight Packs

YOUR BEST ENGINE BUY!

BUILT-IN 15% SAVINGS **BONUS** INCLUDES RECOVERY WADDING FREE!

Great for clubs and groups!

Bargain-priced packs of all supplies needed for 12 exciting flights. Each includes 12 engines, 12 Sure-Shot II igniters and instructions at about a 15% savings compared to standard 3-packs. BONUS! Includes SPW-19 chute wadding at no extra cost!

A8-5 FLIGHT PACK—For Viking #5445
Engines: (12) A8-5 **$8.00**

NEW SPORT FLIGHT PACK—Popular Types #5446
Engines: (3) A8-3, (3) B6-4, (3) C6-5, (2) B6-6, (1) C6-7 **$8.50**

NEW "C" FLIGHT PACK—Ass't of "C" Types #5447
Engines: (2) C6-3, (4) C6-5, (3) C6-7, (3) C5-3S **$9.00**

PACK

- LOWEST-COST ROCKET PROJECT
- ASSEMBLED IN SINGLE SESSION
- MOTIVATING • SAFE
- NO EXPERIENCE REQUIRED

VIKING 12-PACK—Contains parts for 12 Viking rockets, 12 assembly instructions and the Viking Leader's Guide. The Guide is a brief and comprehensive introduction to model rocketry; it explains running the building and flying sessions, 3 fun-flying contests and how to cut costs on obtaining a launch system. Buying Vikings in 12-packs costs even less per rocket than by the single kit. Engines not included.

Prod. No. 5441

$17.95

Viking

SINGLE KIT VERSION

The Viking is a simple kit featuring all pre-shaped & pre-colored parts, fibre fins with design options, decals, engine spacer and reliable streamer recovery. Viking is the hobby's lowest priced rocket with a real recovery system. Great for small groups or as a supplement to 12-packs. Engines not included.

Prod. No. 5440 **$1.75**

SPECIFICATIONS
Length 12" (30.5cm)
Body Diam. .76" (1.9cm)
Net Weight 0.8oz (22.7g)

Skill Level 1

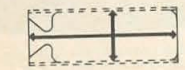
Uses A8-5 Flight Pack (see above) for flying sessions.

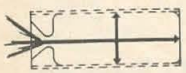
Centuri MODEL ROCKET

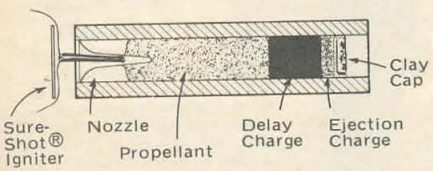
All Centuri ENERJET and MAGNUM-D engines are manufactured by automatic equipment to exacting standards. Designed for one-time use; not reloadable or reusable. The N.A.R. emblem on every engine means they are regularly tested and meet all safety standards. We test 3 out of every 100 engines. We strive to provide the highest quality engines available.

HOW A ROCKET ENGINE WORKS

It's called the Action-Reaction Principle. At rest the rocket has equal pressure on all sides. After ignition the gases escape through the nozzle. This causes a pressure embalance and the engine is forced in the opposite direction from the nozzle. This force is called thrust.

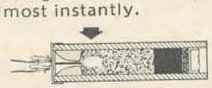






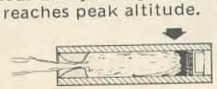
IGNITION TO EJECTION

Battery-operated launch system heats igniter in engine nozzle—propellant starts almost instantly.

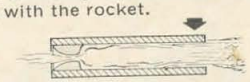


Propellant consumed to develop maximum thrust. Reaction principle causes lift-off & acceleration to coast phase.

Rocket coasts upward after propellant expended. Delay charge continues until rocket reaches peak altitude.



At end of delay, the ejection charge is ignited and gases activate the recovery system. Normally the expended engine returns with the rocket.



ENGINE CLASSIFICATIONS

All Centuri engines are coded so the model rocketeer can easily determine which engine should be used in the rocket. The code consists of three parts as described in next column.

ENGINE CODE EXPLANATION

½A6-4

- The letter is total impulse.* A higher class letter means more power; B is double the power of A and C is double the power of B, etc.
- The first number is average thrust. This indicates how the average power is delivered. The higher the number, the higher the average thrust.
- The last number is the delay code in seconds. This is the time duration from the end of thrust to the activation of the ejection charge.

LABEL COLOR

GREEN: Best delay for most single-stage rockets.

PURPLE: A longer delay usually for multi-stagers or high flying lightweight single-stagers.

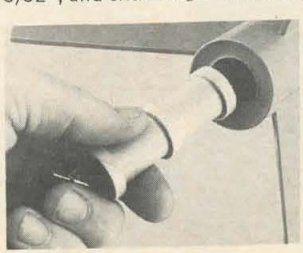
RED: Has no delay (0). For lower stages of multi-stage rockets. Never use a booster engine in single-stage rocket except in kits where specified.

*TOTAL IMPULSE CHART

Engine Type	Total Impulse in Newton-Seconds	Total Impulse in Pound-Seconds
½A	0.626 to 1.25	0.15 to 0.28
A	1.26 to 2.50	0.29 to 0.56
B	2.51 to 5.00	0.57 to 1.12
C	5.01 to 10.00	1.13 to 2.24
D	10.01 to 20.00	2.25 to 5.00

ENGINE SIZE

Centuri's Enerjet and Super-C engines are standard size; they fit most rockets. Magnum-D are larger in diameter and only fit rockets with D-size engine mounts. Using D engines requires extra precautions: glue-reinforced engine mount and fin joints, minimum balsa fin thickness of 3/32", and extra large launch area.



CONVERTIBLE™

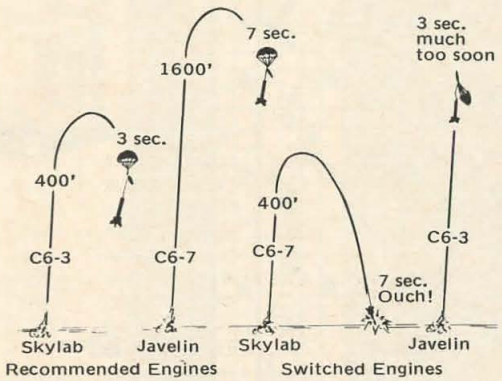
Several Centuri kits include this handy "Plug 'n Go" mount for switching from standard-size to D-size, and back.

ENGINES enerjet® MAGNUM-D™

SEE NEXT PAGE for engine specs & prices

SELECTING ENGINES

Big rockets need much more thrust to get them off the pad, and a shorter time delay. The drawing below compares a large and a small rocket with different time delays.

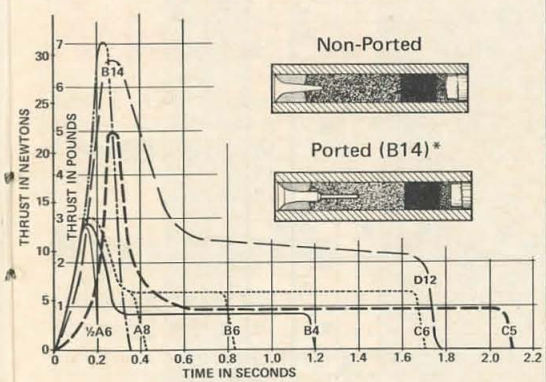


When flying rockets built from Centuri kits, always select engines listed in the Recommended Engine chart on the next page. These have been chosen to give a variety of power while keeping delay times correct for reliable performance.

When choosing the engine for your rocket, consider the launch field size. The greater the power the higher the bird will go and the greater the chance that you will lose it.

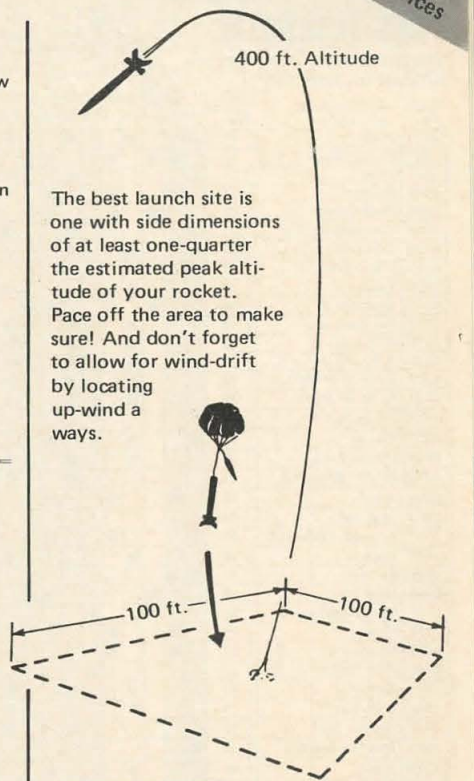
In general, small rockets use engines with long time delays and big rockets use short delays. For rockets of your own design find a similar Centuri kit and use the engine recommended for it.

THRUST-TIME CURVE



The thrust builds to a high level quickly and drops off to a sustaining thrust. The high thrust lifts the rocket off. The sustaining thrust allows the rocket to gradually speed up.

*Ported engines have deeper nozzles and produce higher initial thrust for heavy models.



The best launch site is one with side dimensions of at least one-quarter the estimated peak altitude of your rocket. Pace off the area to make sure! And don't forget to allow for wind-drift by locating up-wind a ways.

COMMON SENSE RULES FOR EXCITING FLIGHTS

1. Launch in areas where you're sure there is no hazard to persons or property. This includes crops or grass that could burn if exposed to hot exhaust gases.
2. Do not fly near power or telephone lines, highways, hi-rise buildings or other obstacles such as radio towers or air fields. Watch out for "Rocket Eating" trees!
3. Pay attention during your launches to people, aircraft, cars or equipment moving into the launch/recovery area.
4. Make a short count-down prior to each launch, to alert spectators.
5. Do not fire your rocket at an angle of more than 30 degrees from the vertical.
6. Keep a clear circle at least 20 feet in diameter around your launch pad.
7. Do not hook up or disconnect the ignition leads until you have removed the safety key. Always keep the key with you so that launching is totally under YOUR control!

RECOMMENDED ENGINE GUIDE

Centuri — enerjet — STANDARD SIZE ENGINES — SUPER C → — MAGNUM-D BIG ENGINES

Kit Index

(Products other than kits are indexed on page 62)

Prod. No.	Centuri rocket kit name	Catalog Page	½A6-2	½A6-4	A8-0	A8-3	A8-5	B4-2	B4-4	B4-6	B6-0	B6-4	B6-6	B8-3	B8-5	B8-7	B14-0	B14-5	B14-7	C6-0	C6-3	C6-5	C6-7	C5-0S	C5-3S	D12-0	D12-3	D12-5	D12-7
			5550	5552	5558	5560	5562	5564	5566	5568	5570	5572	5574	5547	5576	5578	5580	5582	5584	5586	5588	5590	5592	5596	5597	5598	5599		
5039	Argus	10																										M	
5037	Arrow-300	28	●	★		●		●	★		●		●	★			★			★		●	★						
5047	Astro-1	11	●																										
5007	Bandito	14		●		●			●			●			●			●			●							
5036	Black Widow	29			★		●			●			●			●			★			●	★						
5343	Columbia Sp. Sh.	21																											
5330	Cruise Missile	25				●																						M	
5312	E.S.S. Raven	16																			●							M	
5008	Excalibur	20				●															●								
5175	Excalibur 2	29			★		●				●	★				●	★			★		●	★						
5319	F-4 Phantom	26				●					●						●					●							
5318	F-15 Eagle	26				●					●						●					●							
5317	F-16 Fighter	27				●					●						●					●							
5320	F-104 Starfighter	27				●					●						●					●							
5321	5J Israeli Mirage	26				●					●						●					●							
5325	Flying Saucer	18																											
5333	Gabriel	24	●			●			●			●			●			●			●								
5011	Groove Tube	12				●					●						●					●							
5341	Hornet (Magnum)	31																											●
5091	Javelin	12		●			●			●			●			●			●			●							
5342	Jayhawk	31																										●	
5171	Jayhawk (Standard)	20	●			●			●			●			●			●			●								
5110	Laser X	19				●					●						●					●							
5001	Lil' Herc	13	●	●																									
5064	Long Tom	28			★					●	★			●	★			★			●	★							
5131	Merc. Redstone	22					●					●				●												M	
5005	Micron	11		●			●			●			●			●			●			●							
5041	Moonraker	12		●			●																						
5145	Nike Smoke	22					●																					M	
5035	Nomad	21				●			●			●			●			●			●								
5080	Payloader II	14				●			●			●			●			●			●								
5407	Phoenix Bird	10							●			●			●			●			●							M	
5346	Red-Eye Satellite	2	●																										
5332	Sam-3	25	●			●			●			●			●			●			●								
5345	Satellite Killer	2																			●								
5140	Saturn 1B	22								●											●								
5142	Saturn V	23																			●							M	
5173	Screaming Eagle	10				●					●						●					●							
5331	Sea Killer	25	●			●					●						●					●							
5040	Sky Devil	11		●			●			●			●			●			●			●							
5034	Sky-Lab	19					●																					M	
5043	Snipe Hunter	13	●			●			●			●			●			●			●								
5348	Spacemaster	33	●			●			●			●			●			●			●								
5066	Space Shuttle (Orig.)	30																			●								
5344	Spirit of America	13	●			●			●			●			●			●			●								
5349	SR-71 Blackbird	33																			●							●	
5077	SST Shuttle	30					●														●								
5307	S.S.V. Scorpion	16																			●							M	
5072	Starfire	13	●						●			●			●			●			●								
5031	Stiletto	29		●	★		●			●	★			●	★			★			●	★							
5033	Taurus	19				●					●						●					●						M	
5339	Thunder Bird	15				●					●						●					●							
5338	Thunder Hawk	15	●			●					●						●					●							
5340	Thunder Roc	15																										●	
5352	Tomahawk	32																										●	●
5002	Twister	14	●				●						●															M	
5308	U.F.O. Invader	17																										M	
5310	U.S.S. America	17																										M	
5440	Viking	11&35	●				●				●						●												

CONVERTIBLE — CONVERTIBLE — CONVERTIBLE — CONVERTIBLE

NEW

"B8" engines for higher initial thrust in larger models!

★ Star indicates this is a BOOSTER engine (no ejection charge).

CONVERTIBLE indicates this kit includes parts for flying with standard size or with big engines.

M indicates this standard engine kit may instead be built with a D engine mount for D-power (easily converts back with EM-9). See page 46.

Safety & Contest Certified

NATIONAL ASSOCIATION OF ROCKETRY

ENGINE SPECS

Typical Enerjet shown actual size

Centuri Enerjet and Magnum-D engines are sold in boxes with three engines of one type. Sure-Shot II igniters and complete operating instructions are included.

enerjet®

STANDARD SIZE ENGINES—Centuri's reliable engine designed to fit all regular model rockets. Size is 2.75" long (6.99cm) and 0.690" diam. (1.75cm).

Prod. Number	Type	Prices 3 For	Total Impulse N-sec.	Average Thrust Newtons	Thrust Duration Seconds	Delay Time ±15% Seconds	Engine Weight Ounces	Recom. Max. Lift-Off Wt. (with engines) Ounces	Single Stage	Booster	Label Color
5550	½A6-2	$2.25	1.25	6.23	.20	2	.53	2.5	X		Green
5552	½A6-4	$2.25	1.25	6.23	.20	4	.54	1.5	X		Purple
5558	A8-0	$2.35	2.50	7.81	.32	0	.51	4.5		X	Red
5560	A8-3	$2.35	2.50	7.81	.32	3	.57	5.0	X		Green
5562	A8-5	$2.35	2.50	7.81	.32	5	.62	2.5	X		Purple
5564	B4-2	$2.45	5.00	4.15	1.20	2	.70	5.0	X		Green
5566	B4-4	$2.45	5.00	4.15	1.20	4	.74	4.5	X		Green
5568	B4-6	$2.45	5.00	4.15	1.20	6	.78	3.5	X		Purple
5570	B6-0	$2.45	5.00	6.00	.83	0	.58	5.0		X	Red
5572	B6-4	$2.45	5.00	6.00	.83	4	.78	5.0	X		Green
5574	B6-6	$2.45	5.00	6.00	.83	6	.71	3.0	X		Purple
5547	B8-3	$2.55	5.00	8.33	.60	3	.64	6.0	X		Green
5548	B8-5	$2.55	5.00	8.33	.60	5	.68	5.0	X		Green
5549	B8-7	$2.55	5.00	8.33	.60	7	.72	2.5	X		Purple
5576	B14-0*	$2.55	5.00	14.23	.35	0	.61	6.5		X	Red
5578	B14-5*	$2.55	5.00	14.23	.35	5	.69	6.5	X		Green
5580	B14-7*	$2.55	5.00	14.23	.35	7	.73	4.0	X		Purple
5582	C6-0	$2.65	10.00	5.86	1.70	0	.80	6.0		X	Red
5584	C6-3	$2.65	10.00	5.86	1.70	3	.88	6.0	X		Green
5586	C6-5	$2.65	10.00	5.86	1.70	5	.91	5.0	X		Green
5588	C6-7	$2.65	10.00	5.86	1.70	7	.95	3.5	X		Purple
5590	C5-0S†	$2.65	10.00	4.76	2.10	0	.82	8.0	X	X	Red
5592	C5-3S†	$2.65	10.00	4.76	2.10	3	.90	8.0	X		Green

*These are ported (B8's are semi-ported) †These are "Super-C" engines

MAGNUM-D™

BIG ENGINES—"Fly Bigger—Higher—Faster"! Powerful engines recommended for experienced rocketeers. Size is 2.75" long (6.99cm) and 0.945" diam. (2.4cm).

5596	D12-0	$4.95	20.00	11.76	1.70	0	1.44	14.0		X	Red
5597	D12-3	$4.95	20.00	11.76	1.70	3	1.49	14.0	X		Green
5598	D12-5	$4.95	20.00	11.76	1.70	5	1.52	10.0	X		Green
5599	D12-7	$4.95	20.00	11.76	1.70	7	1.55	8.0	X		Purple

Enerjet and Sure-Shot are registered trademarks of Centuri Engineering Co., Inc.

Igniters

Two Styles—Each with its features and advantages. Choose type best for you.

"SURE-SHOT" II® Two Quantities!

6-PACK
- Saves Battery
- Pre-assembled
- Best for "D's"
- Sensitive
- Fastest
- Ignition

#5690
6 Igniters $1.15

12-PACK:

SAVE 15% WITH 12-PACK BONUS COSTS LESS THAN TWO 6-PACKS!

#5692
12 Igniters $1.95

ORIGINAL "SURE-SHOT"®

- High Reliability
- Hottest Ignition
- Best for Clusters
- U.S. Patent No. 3,422,763
- Proven Design

#5836
12 Igniters $2.00

Flight Packs

Selected Enerjet engines are available at reduced cost in quantities of 12. See "Flight Packs" on page 34.

SAVE!

Loaded with all these SPECIAL FEATURES:

(Rocket not included)

Ignition Wires and Micro-Clips

Launch Rod Tilter for wind drift correction.

Large Steel Blast Deflector

Launch Controller is stored here in carrying handle.

Uses existing battery post caps for solid attachment.

Centuri

LAUNCH EQUIPMENT

SAFETY ENGINEERED!

Powr Pad™

POWR PAD™

Practical, Portable & Compact

CONTROLLER FEATURES:

- Medallion Safety Key; big, so its hard to lose.
- Check Light
- Launch Button
- 15 Foot Preassembled Wire Harness
- Bright Metallic I.D. Stickers

Lantern Battery

Wire stores around controller.

Powr Pad gives you everything you need for for launching almost any rocket. Designed to attach firmly to any standard 6 volt lantern battery*, it includes tilter, steel blast deflector, handy carrying handle, 1/8" 2-piece launch rod, plus launch controller and associated wiring. Launch support platform is made of tough heat-resistant plastic. Pre-assembled and soldered wiring harness makes for fast assembly and reliability you can count on.

Prod. No. 5609 Skill Level 1 **$13.95**

Lightning Bolt™

LIGHTNING BOLT™

BASIC & SIMPLE!

Lightning Bolt is stripped of deluxe features found in our bigger launchers but includes everything you need to get started in model rocketry! Features 1/8" 2-piece launch rod, medium sized deflector, and all hardware for assembling your 15 foot wiring harness. Clean design gives years of service.

Prod. No. 5608

$7.50

Skill Level 1

SPECIAL FEATURES:

- Hobby's lowest price
- Launch Rod Cap
- Accepts 12 or 6 volt.

Safety Key

Check Light

Rod Cap

Metallic Stickers

15 Foot Wire

NEW

Accessories & Replacement Parts

DEFLECTOR

All steel 4" x 6" designed to protect fins & nearby foliage from hot rocket gases. Use on Powr Pad and Power Tower.

ID-65 Deflector
Prod. No. 5806
$1.25 each

LAUNCH ROD

2-piece 1/8" steel. Use for your own "home-built" launch system or as a replacement part for POWR PAD or POWER TOWER or others.

LR-125 Launch Rod
Prod. No. 5800
$1.00 each

A "MUST" FOR THE BIG ONES!

HEAVY DUTY LAUNCH ROD

Extra strong, 2-piece launch rod 3/16" in diameter. Compatible with Power Tower. Designed for heavy duty launching of your biggest rockets such as Saturn V, and Thunder Roc.

Prod. No. 5803
$2.25 each

NEW

MICRO-CLIPS Set of 2

Great for replacement or "own design" launchers, spring-grip all igniters.

EMC-34 Clips
Prod. No. 5812
2 for $1.00

HEAVY DUTY BATTERY CLIPS

Set of 2

These copper clips will connect to any battery. Jaws open to 1-1/8". Colored handles to identify polarity.

EMC-46 Clips
Prod. No. 5818
2 for $2.00

Power Tower™

Prod. No. 5601

$8.00

SPECIAL FEATURES:

- Heavy Duty Deflector
- Tilting Rod
- Accepts 3/16" Rod
- Best for big rockets & "D's"
- Very Stable
- Breaks down to compact size

Metallic "Spec-Plate" Launch Check-List

Skill Level 1

A heavy duty plastic tripod launcher with authentic detailing. Universal design lets you launch all sizes and types of rockets from minis to large cluster-types. Features removable legs, tiltable launch rod, big blast deflector and 2-piece 1/8" launch rod. Assembles in minutes. Great for rocket storage and display, too!

**Requires a Launch Controller such as POWR-CONTROL below.*

power tower™

Powr-Control

Powr-Control is the perfect controller for the Power Tower launcher or can be used with any launch stand. Contains 16 feet of igniter line and 5 feet of heavy-duty jumper cable with large color-coded battery clips. Controller contains recessed launch button, continuity light and safety key. Fly the D-powered and cluster rockets with this one!

POWR-CONTROL™ **$9.00**

Prod. No. 5623

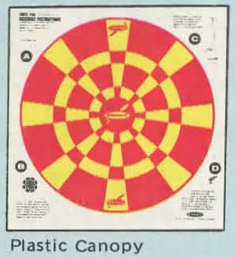
Skill Level 2

Typical power hook-up using auto battery

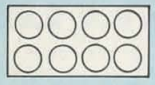
Centuri

RECOVERY DEVICES

EVERY CHUTE KIT CONTAINS:

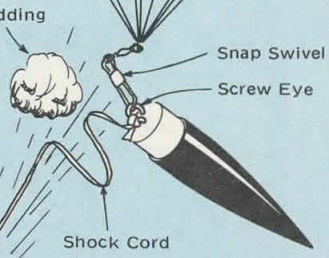


Plastic Canopy

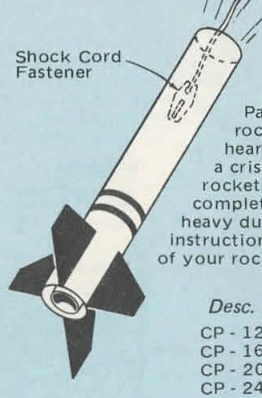


Tape Discs

Shroud Line



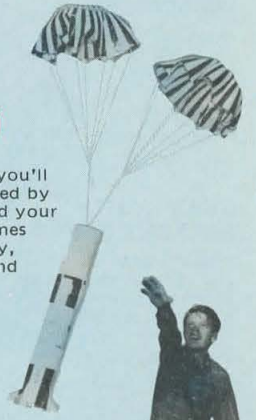
R&D Tip
Find screw eyes and snap swivels at any hardware store. See Flight Manual F:2F and F:5B.



Chute kits

Parachute recovey is a high point of any rocket flight. After the "coasting" phase, you'll hear the chute assembly "pop" free, followed by a crisp "snap" as the canopy fills with air and your rocket starts its descent. Each chute kit comes complete with a tough plastic 2-color canopy, heavy duty shroud line, super stick tape discs, and instructions for assembly. Check the net weight of your rocket and specify correct canopy size.

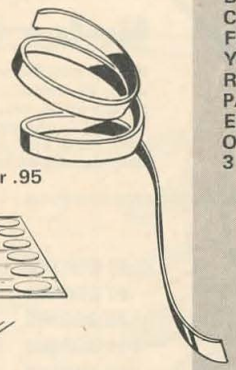
Desc.	Prod. No.	Dia.	Max. Net Wt.	Each
CP - 12	(5854)	12"	2 oz.	.85
CP - 16	(5860)	16"	4 oz.	1.00
CP - 20	(5866)	20"	6 oz.	1.10
CP - 24	(5872)	24"	8 oz.	1.35



Shock Cord Set of 3

This super strong elastic cord connects recovery chute or streamer to the rocket body. Use SC-18 cord with birds powered by ½A thru C engines.

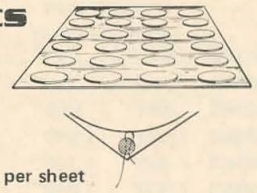
SC-18 Shock Cord, Prod. No. 5894 **3 for .95**



Tape Discs

Attach streamer or parachute shroud lines permanently with these super-stick discs! 36 discs per sheet.

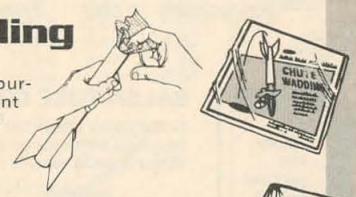
TD-35 Discs
Prod. No. 5890 **.80 per sheet**



Chute Wadding

CREPE-TYPE:
Most flame-resistant: All purpose, easy to use; just count number of sheets. Enough for 25 #7 rockets.

SPW-19 Crepe Wadding
Prod. No. 5846 **1.25**



COTTON TYPE
Flame-resistant and soft! Also recommended for rocket diameters above 2 inches, enough for 20 flights in #7 rockets.

PW-19 Cotton Wadding
Prod. No. 5842 **1.50**

Parachute Powder

Keep that chute "POPPING" SMOOTHLY" with Centuri's special chute powder lubricant. Sprinkle it on during folding and look for a small dust cloud at apogee. It really works!

PDR-17 Chute Powder
Prod. No. 5880 **1.75**
2 oz.

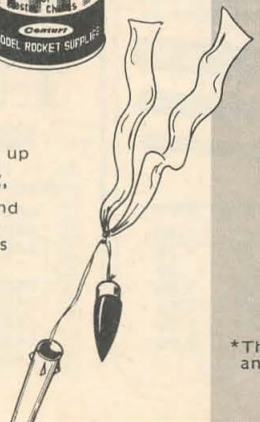
Special shaker can

Plastic Drag Streamer Set of 3

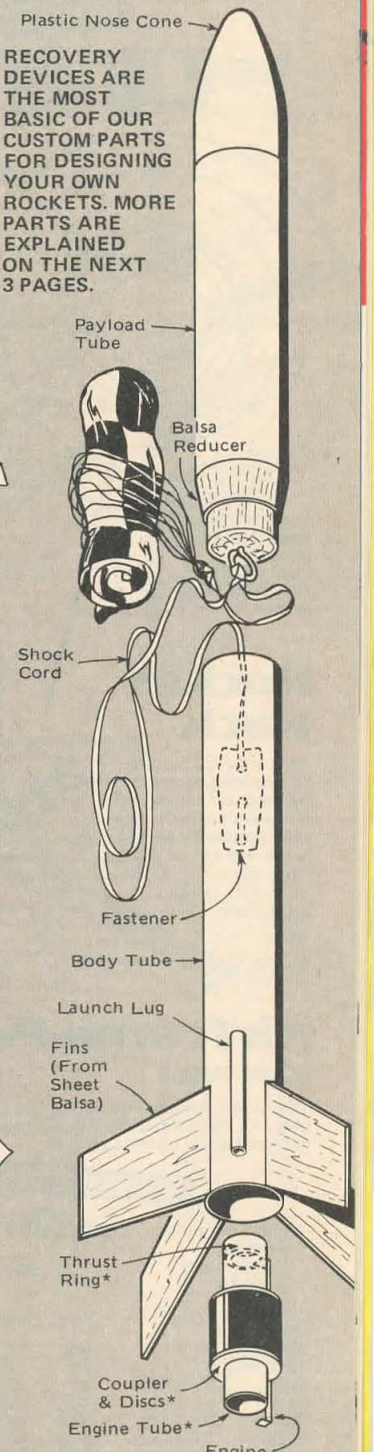
For soft-recovery of rockets weighting up to one onuce. A bright day-glo orange, these streamers are over 1" wide & 36" long! They eject the same as a chute and are highly visible for those almost-out-of-sight flights! Includes tape discs plus instructions. Net weight is .09 ounces.

RS-20 Streamers
Prod. No. 5914 **3 for .95**

R&D Tip See Flight Manual F:5A



RECOVERY DEVICES ARE THE MOST BASIC OF OUR CUSTOM PARTS FOR DESIGNING YOUR OWN ROCKETS. MORE PARTS ARE EXPLAINED ON THE NEXT 3 PAGES.



*These parts make an engine mount

Centuri

CUSTOM MODEL ROCKET PARTS

R&D Tip Also see Designers Special (Pg. 32).

Selecting Parts

For simplicity, all parts numbers are based on seven body diameters. That is, a No. 8 body tube fits a No. 8 nose cone, No. 8 engine mount, No. 8 connector, etc. Use the body tube guide circles at left to determine what sizes you need. A rocket fin guide (4 or 3 fin configuration) template is also included. Illustrations of the parts are not necessarily to scale. More information on designing and building your own rocket is contained in the Flight Manual section of this catalog. Always order parts by product number. number and description. Example: 6002 ST-518

	DIAMETERS Inside	Outside
#5 SERIES	.515"	.543"
#7 SERIES	.715"	.759"
#8 SERIES	.865"	.908"
#10 SERIES	1.000"	1.040"
#13 SERIES	1.300"	1.340"
#16 SERIES	1.600"	1.640"
#20 SERIES	2.000"	2.040"

Dotted line indicates #9 series tube: used mostly for Magnum-D engine mounts.

Rocket Rack

R&D Tip See Super Kit section to see Rack in use.

This simple-to-build rocket display can be used for display or storage of your rocket. It's super-easy to assemble using pre-cut colored fibre parts and white glue. Fits nearly all rockets.

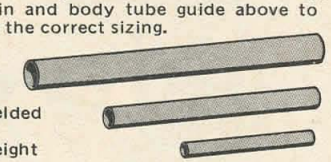
6500

$1.50

Airframe Parts

BODY TUBES

This is the tubing that forms the rocket body. Use the fin and body tube guide above to determine the correct sizing.

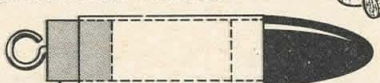


Heat-welded
Strong
Lightweight
Smooth

Prod. No.	Desc.	Size	Length	Price
6002	ST-518	#5	18"	.70
6004	ST-718	#7	18"	.75
6006	ST-818	#8	18"	.90
6008	ST-1018	#10	18"	1.00
6010	ST-1318	#13	18"	1.10
6012	ST-1618	#16	18"	1.30
6014	ST-2018	#20	18"	2.00

BALSA TUBE CONNECTORS

Solid balsa plugs for connecting payload sections to body tubes when a solid wall is needed.



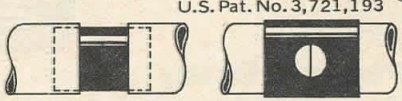
TUBE CONNECTOR

Prod. No.	Desc.	Size	Length	Price
6270	BTC-7	#7	1"	.55
6272	BTC-8	#8	1"	.65
6274	BTC-10	#10	1¼"	.75
6276	BTC-13	#13	1½"	.85
6278	BTC-16	#16	1¾"	.95

HOLLOW TUBE COUPLERS

Great for multi-staging connections & cutting guides for body tubing. Joins equal diameter tubes. Extremely strong.

U.S. Pat. No. 3,721,193



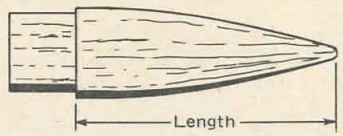
STANDARD TUBING COUPLER USAGE

PART NO. HTC-7CDH* IS OUTSIDE COUPLER

Prod. No.	Desc.	Size	Length	Price
6420	HTC-5	#5	¾"	.45
6422	HTC-7A	#7	1"	.45
6426	*HTC-7CDH	#7	Staging Coupler	.50
6428	HTC-8	#8	1"	.50
6430	HTC-10	#10	1"	.55
6434	HTC-13	#13	1.5"	.55
6438	HTC-16	#16	1.75"	.65
6440	HTC-20	#20	1.75"	.75

Nose Cones

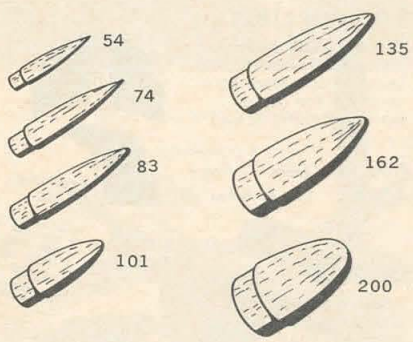
BALSA NOSE CONES



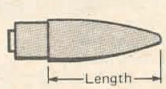
Length

Balsa nose cones are machined from high grade light-weight balsa lumber. They require "sand and seal" finishing before painting, and a screw eye (not included) for shock cord attachment.

Prod. No.	Desc.	Size	Length	Price
6130	BC-54	#5	2.4"	.75
6136	BC-74	#7	3.5"	.85
6140	BC-83	#8	3.2"	1.00
6148	BC-101	#10	2.0"	.95
6156	BC-135	#13	3.9"	1.35
6160	BC-162	#16	3.4"	1.50
6164	BC-200	#20	2.5"	2.00



PLASTIC NOSE CONES

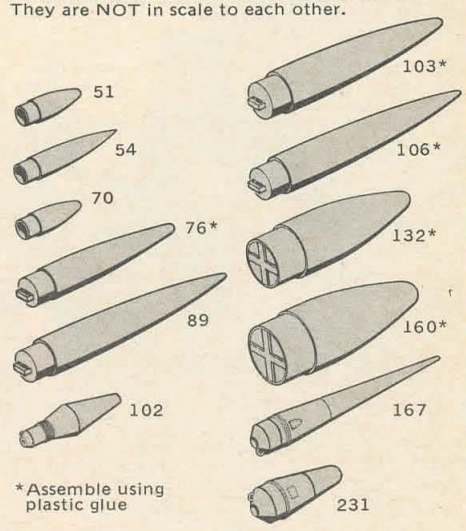


Length

Plastic nose cones are precision-molded in a wide variety of shapes and sizes. Most have bases with lugs (or eyelets) for attaching shock cords. Plastic cones are ready-to-use in bright colors. May be painted with enamel.

Prod. No.	Desc.	Size	Length	Price
6202	PNC-51	#5	1.0"	.45
6204	PNC-54	#5	2.2"	.55
6210	PNC-70	#7	1.5"	.45
6214	PNC-76	#7	3.0"	.60
6220	PNC-89	#8	4.6"	1.00
6226	PNC-102	#10	4.3"	1.35
6227	PNC-103	#10	4.1"	1.00
6228	PNC-106	#10	4.5"	1.00
6232	PNC-132	#13	2.7"	.90
6236	PNC-160	#16	2.5"	1.10
6240	PNC-167	#16	9.3"	1.40
6244	PNC-231	#20	3.2"	1.40

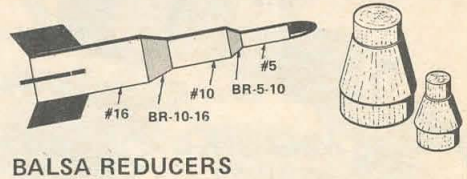
Illustrations are for shape comparison only. They are NOT in scale to each other.



*Assemble using plastic glue

Reducers

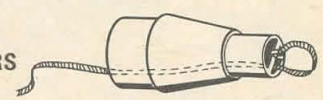
Reducers connect body tubes of different diameters. They can be solid (balsa) or hollow (plastic—paper). You would want a hollow reducer where ejection gases must pass through to activate the recovery system.



BALSA REDUCERS

Prod. No.	Desc.	Fits	Price
6352	BR-58	5 to 8	.75
6354	BR-510	5 to 10	.80
6358	BR-710	7 to 10	.70
6360	BR-713	7 to 13	1.00
6362	BR-810	8 to 10	1.25
6364	BR-816	8 to 16	1.30
6366	BR-1013	10 to 13	1.10
6368	BR-1016	10 to 16	1.25

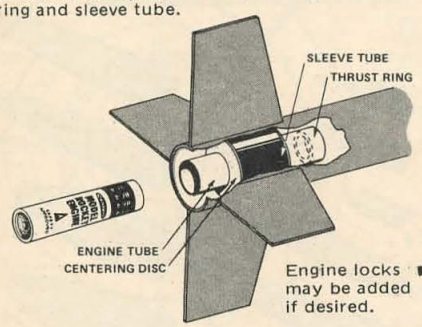
PLASTIC REDUCERS



Prod. No.	Desc.	Fits	Price
6386	PSR-78	7 to 8	.60
6388	PSR-813	8 to 13	.80
6390	PSR-1620	16 to 20	.95

Engine Mounts

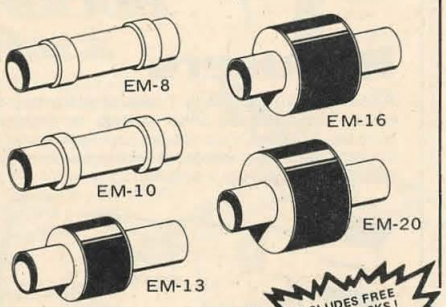
These mounts hold and center the rocket engine in the "airframe" body tube. They can be adapted to #8, 9, 10, 13, 16, & 20 body tube sizes. You get everything you need including centering discs, engine mount tube, thrust ring and sleeve tube.



Engine locks may be added if desired.

STANDARD MOUNTS

Prod. No.	Desc.	Fits	Price
6052	EM-8	#8	.85
6060	EM-10A	#10	.95
6064	EM-13	#13	1.00
6068	EM-16	#16	1.10
6072	EM-20	#20	1.40



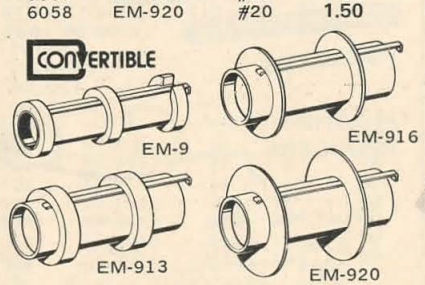
NEW MAGNUM-D™ MOUNTS

INCLUDES FREE ENGINE LOCKS! BONUS (NOT INCLUDED IN REGULAR MOUNTS!)

See chart on page 38 for kit application. EM-9 converts D's back to standard engine size.

6055	EM-9	#9	1.00
6056	EM-913	#13	1.15
6057	EM-916	#16	1.25
6058	EM-920	#20	1.50

CONVERTIBLE



Miscellaneous

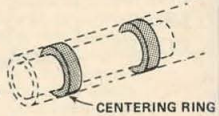
THRUST RINGS

These featherweight fibre rings are 3/8" long. Used as forward engine stop when glued into any #7 series body tube. (6 ea.)

Prod. No.	Desc.	Price
5966	TR-7	6 for .95

CENTERING RINGS

These rings center the engine tube (#7) in #8 & #10 body tubes. (6 ea.)

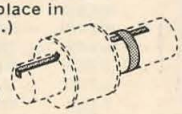


Prod. No.	Desc.	Fits	Price
5970	CR-8	#8	6 for .85
5974	CR-10	#10	6 for .85

ENGINE LOCKS

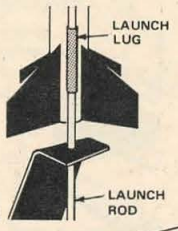
Includes mylar holding ring and steel lock strip. Keeps engine firmly in place in flight & during ejection. (3 ea.)

Prod. No.	Desc.	Price
5980	EL-1	3 for 1.00



LAUNCH LUGS

Slender tube glued to side of the rocket. The launch rod passes thru to guide the rocket during lift-off. (6 ea.)



Prod. No.	Desc.	Price
5928	LL-3	6 for .60

DECALS

While nearly all Centuri rocket kits have their own decals, these at right are ideal for taking your kit one step further. The sheets are large (approx. 4" x 10") and made in two, three and four rich colors.

M-314 Centuri Emblems
36603 .85

DC-3 Military Insignias
36607 1.00

DC-4 Missile Markings
36608 1.00

DC-35 U.S. Flags
36629 1.00

All parts on this page include illustrated instructions for their use. Look for packages like these.

Centuri POWER SYSTEM OUTFIT™

BUILD AND FLY UP TO SEVEN ROCKET CONFIGURATIONS

Here's the biggest and by far the most exciting Model Rocket outfit ever offered! Both the beginner and the advanced rocketeer can learn more about rocket technology, experience multi-staging* and move into the exciting world of engine clustering with this fascinating flying rocket science set. With Rocketry Exploration you'll fly higher and faster than ever before. This one-of-a-kind outfit is built around a modular design concept where each rocket is adaptable to several recovery and thrust modes, including our exclusive Plug-N-Go engine mounts that are field-interchangeable for either single engine or double engine (clustered) thrust. Body tube extensions, multi-staging and different recovery chute sizes let you move at a simplified pace into new realms of rocket flight experiences. Construction is simple and straight-forward and each launch is loaded with anticipation of expected results. Rocketry Exploration—never before has so much been offered to both the beginner and advanced rocketeer.

Prod. No. 5200
$29.95

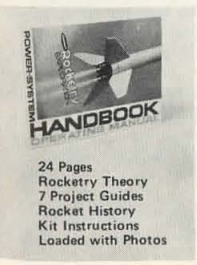
*U.S. Pat. No. 3,721,193

FROM THE Rocketry EXPLORATION™ SERIES

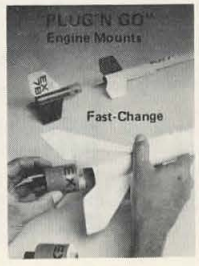
THE COMPLETE MODEL ROCKET EXPERIENCE!

Single Stage • Duration • Altitude • Staging • Payload • Cluster

NINE EXCITING FLIGHT PROGRAMS!



24 Pages
Rocketry Theory
7 Project Guides
Rocket History
Kit Instructions
Loaded with Photos



Centuri PUBLICATIONS

NEW

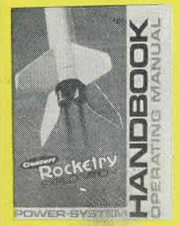
The "Basics of Model Rocketry" at lower right is a simple introduction with enough info to give you a good start in competition. Well illustrated, it includes color photos and two complete plans. The author is a professional writer, skilled rocketeer and swell fellow.

CLUB GUIDE

The new Centuri Club Guide is filled with useful information about rocket clubs. Topics covered include: how to organize, running a club range, publicity and growth, club activities, publishing a newsletter, funding and working with authorities. Rocketeers starting their own rocket club, as well as established clubs, will find solid help in this manual. Indispensible for teachers and youth leaders and all club libraries. 28 pgs. 53 illustrations.

Prod. No. 81896 **$1.00**

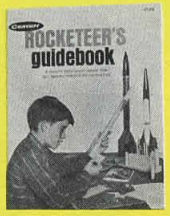
POWER SYSTEM HANDBOOK



Seven exciting rocket projects with historical info, flight procedures, engines and construction. 200 illustrations. 24 pages.

Prod. No. 81527 **$1.00** *Included In Power System Outfit*

ROCKETEER'S GUIDEBOOK



The good basic reference for all rocketeers. Info from "A to Z." Richly illustrated with charts & photos. 36 pages.

Prod. No. 81900 **$1.25** *Included In Big Shot Outfit*

TECH INFO REPORTS

Everything you need to know about Rocket Stability (TIR-30). Center of Pressure (TIR-33), and Altitude Performance (TIR-100).

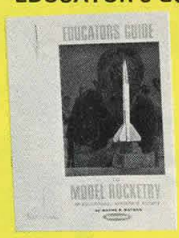
- TIR-30 (16 pages) Prod. No. 81903 **$1.25**
- TIR-33 (36 pages) Prod. No. 81904 **$1.25**
- TIR-100 (40 pages) Prod. No. 81906 **$1.25**

DESIGN MANUAL

Loaded with tips on building "own design" including payloaders, boost and high altitude. 200 illustrations, 32 pages.

Prod. No. 81899 **$1.25**

EDUCATOR'S GUIDE



Teacher's guide for rocketry in the classroom. Includes knowledge tests and suggested curriculum. 64 pages.

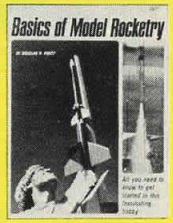
Prod. No. 81916 **$2.00**

This chart shows which Centuri publications to use for specific information. The "F" numbers and subjects are all in the Flight Manual. The starred entries indicate that subject is covered in extra detail in that specific publication.

	REGULAR PUBS (described above)								SPECIAL ITEMS(Rt)			
	Club Guide	Design Manual	Power System	Rocketeer's Guide	Educator's Guide	TIR-30 Stability	TIR-33 Ctr. of Pr.	TIR-100 Altitude	ETV Model Book	Basics of Mod. Rock.	TIR-25 Super C	TIR-52 Clustering	Mini-Manual
F:1 TOOLS & MATERIALS	★		●	●				★	●				
F:2 CONSTRUCTION TECHNIQUES	★	●	●	●				★	●		●		
F:3 FINISHING TECHNIQUES	★	●						★	●				
F:4 ENGINE INFORMATION		●	★	★					●	●	●		
F:5 RECOVERY TECHNIQUES	★	★	●	●					●			●	
F:6 FLIGHT PREPPING	★	●	●	●					●		●	●	
F:7 STABILITY & PERFORMANCE	★	●	●	●	★	★	★		●	●			
F:8 MULTI-STAGING	★	★	●	●					●	●			
F:9 BOOST GLIDERS	★		●	●					●				
F:10 CLUSTERED ENGINES	★	★							●		●		
F:11 ON YOUR OWN	★	●	★	●	★	●	●	●	★	●			

SPECIAL ITEMS (see pg. 5)

BASICS OF MOD. ROCK. by D.R. Pratt. Very complete introduction. Large size. 110 illus. #5478 **$5.50**



E.T.V. MODEL BOOK Build and fly space & Special Effects models. 192 pgs. 149 illus. #5479 **$7.95**

TIR-25 SUPER-C Engine Tech Rpt. #907,294 (send stamped env.)

TIR-52 CLUSTERING Tech Report #81905 (free in Saturns) **35¢**

MINI-MANUAL: Overview of the hobby #81915 (free in outfits) **15¢**

YOUR OFFICIAL MODEL ROCKETRY GUIDE

AN 8-PAGE BONUS!

FLIGHT MANUAL

This publication is filled with basic info to get you started off on the right foot in your own model rocketry program. The "F" numbers in the publication chart of your catalog are references. Your catalog had many R&D tips which refer you to an "F" number within this FLIGHT MANUAL.

Centuri

INTRODUCTION

The following is a planned rocketry program which will introduce you to the varied aspects of this exciting hobby. Each step adds new skills and activities. By the time you complete each step of the program, you will be an experienced rocketeer in all the major areas of model rocketry.

BASIC SINGLE STAGE KITS:*

Build and launch several single-stage kits to learn basic rocket construction and recovery devices. These are good choices:

1 Screaming Eagle . . . Parachute
2 Astro-1, Javelin . . . Parachute, balsa parts
3 P.S. X-7 . . . . . Parachute, balsa parts
4 Lil' Herc . . . . . Tumble
5 Micron . . . . . Streamer
6 Flying Saucer . . . . . Drag Recovery

ROCKET STABILITY: (F:7)

Read Centuri's TIR-30 technical report to learn "What makes a rocket fly straight," "What is the Center of Pressure," and "How to test for stability."

PAYLOAD LAUNCHING:*

Launch a standard payload weight to determine the effects of weight on model rocket flight. Use payload models such as:

Snipe Hunter Payloader II Power System X-16

MULTI-STAGING:* (F:8)

Build and launch one of the multi-stage kits to learn techniques of stage coupling, separation and and upper-stage ignition, such as:

Black Widow Excalibur Power System X-7
Arrow 300 Long Tom Stiletto

CALCULATING ROCKET ALTITUDE:

Read Centuri TIR-100 technical report to learn how to figure the altitude of your models before you fly them. Learn how to select the proper delay time for different models.

BOOST GLIDERS: (F:9)

Build and fly one of the following models to learn the basics of rocket gliders:

Space Shuttle SST Shuttle Mini Dactyl

CLUSTER IGNITION:* (F:10)

Build and fly multiple-engine rockets to learn the techniques involved in flying cluster models.

Saturn V Saturn 1B Power System X-16

*All the elements of the program marked with an asterisk can be found in the Centuri Rocketry Exploration Power System Outfit.

CUSTOM DESIGNING:

Use the Centuri Design Manual and Parts Assortments to create an original design.

F:1 TOOLS & MATERIALS

Work Area: Choose a work area that is well-lighted, ventilated and is in an out-of-the-way place. It should have a smooth, flat surface and enough room for you to work.

Glue: Different glues are for different jobs. White glues or aliphatic resin glues (such as Wilhold glue) are for gluing porous surfaces together (wood and paper). Plastic resin and liquid plastic glue are for plastic, although they work in different ways. Plastic resin actually forms a link of plastic between the two parts while liquid plastic glue "welds" the two parts together. Sometimes you may even use epoxy or the super-strong cyano-acrylate glues, but be careful! Once these strong glues are applied they are tough to get off.

Knife: A modeling knife is an invaluable tool. A good knife like an X-Acto knife will come in very handy, but keep a good, sharp blade in it.

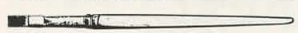
This blade style is best.

Scissors: You will need scissors to cut out paper parts and shroud lines. Get a good pair and keep them in good working order.

Sandpaper: A selection of different grits of sandpaper will help you do a good job in shaping balsa parts like fins and wings. Grits of 120 to 300 are the most commonly used.

Brushes: Get a large and small brush of good quality so that the bristles don't fall out after use.

#1 or 2 artist



1/4" to 1/2"

Body Tubes: Body tubes are made of paper with a special glassine coating that gives them a smooth surface and makes them stronger. Many modelers will fill the spiral seam lines in body tubes by painting them with sanding sealer or balsa filler-coat.

Balsa: Balsa is used to make nose cones, transition sections and fins. Balsa grain needs to be filled with an appropriate filler, such as Hobby Poxy or Fillercoat.

Plastic: Plastic parts may include nose cones, fins and even the entire body of the rocket. Plastic is lightweight, strong and easily cut and shaped.

Fibre: Fibre-board, a kind of thick cardboard can be used to make fins. Almost as strong as balsa, it does not need to be finished because it has a smooth surface which can be painted as is. Edges may need a glue seal.

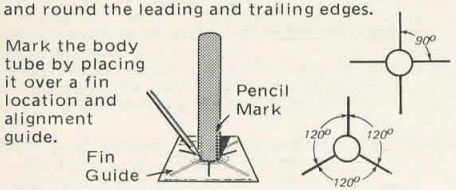
F:2 CONSTRUCTION TECHNIQUES

A. FINS

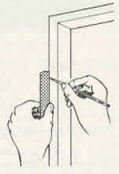
Select a fin shape and draw it on to a piece of card stock to make a fin template. Cut out the template and trace the pattern on to the balsa sheet, making certain the grain in the balsa runs toward the side of the fin which will be glued to the rocket (root edge).

Balsa is soft and easy to cut, but a few basic rules must be followed to get consistently good results. Always use a metal straight edge as a cutting guide and always use a sharp knife. Hold the knife straight and cut in several light passes. This results in a neater cut with less dulling of the blade. Hold knife as shown for best results.

Before attaching fins to the rocket, sand all fins to the proper shape. Place them together and even up the edges with a sanding block or by running them over a sheet of sandpaper held flat on your work surface. Lightly sand the surface of the fins and round the leading and trailing edges.

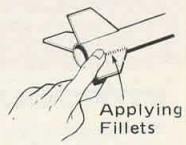


Extend the lines parallel with the long axis of the body tube by placing the tube against a door jamb, the lip of a drawer, or other material which has parallel sides and a thickness of at least ½ the body diameter. Extend the lines you marked on the tube the full length of the tube with a pencil.



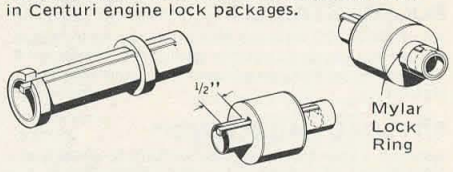
When gluing fins to the body tube, whether they are balsa or fibre, it is a good idea to get a good strong glue joint. This is done by using a technique called "pre-gluing." Apply a line of glue to the root edge of a fin and place it on the tube, aligning it properly. Now remove the fin from the tube and allow the glue to dry slightly, until it is "tacky!" Apply another line of glue and replace the fin on the body tube. Allow the glue to dry and you'll find you have a very strong and durable joint.

Always check the alignment of the fins as they are drying to be sure you don't glue the fins on crooked. Once all the fins have been glued in place and the glue has dried, you should add glue fillets to all joints to make them extra strong, Apply glue along the joint between the body tube and the fin, on each side of the fin, and smooth into a fillet with your finger, as shown at right. Support the rocket so the glue won't run while it dries.



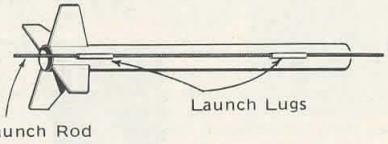
B. ENGINE MOUNTS

There are basically two types of engine mounts, shown below. One uses two solid rings which hold the engine tube in place, while the other uses two thinner cardboard rings supported by a stage coupler tube. Both are effective engine mounts. It is usually a good idea to use an engine lock wherever possible because this means you can change engines quickly without taping for a tight fit. You can add an engine lock to any engine mount used in a size 10 tube or larger by simply cutting a small slot in the engine tube below the thrust ring to accomodate the engine lock. Also cut a slit in the lower ring. The upper ring will serve to hold the lock in place. You may want to use a mylar lock ring for the purpose as shown. These are supplied in Centuri engine lock packages.



C. LAUNCH LUGS

It is important that launch lugs be glued on correctly because they help to guide the rocket for the first three feet of its flight. Always check the alignment of your launch lugs carefully, especially if there is more than one lug. You can use a spare launch rod to be certain the lugs are properly aligned.



D. NOSE CONES

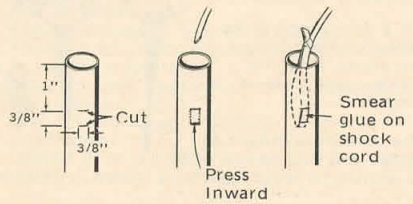
Sometimes it is necessary to correct the fit of cones and payload sections because they are too tight or too loose in the body tube. For a balsa nose cone, sand the base of the nose cone slightly if the fit is too tight. If the nose cone is plastic, peel away the first inner layers of paper inside the body tube. If the nose cone is too loose, add a wrapping or two of masking tape to the base of the cone. It should fit snugly but not so tight that it will fail to come off when the ejection charge is activated.

E. SHOCK CORDS

Shock cords absorb the shock of ejection and also link the body of the rocket with the nose cone and recovery device. There are many ways to attach shock cords but here are two easy and effective ways:

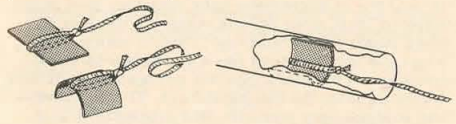
TUBE-SLIT METHOD:

Cut two slits clear through the tube far enough down the tube so the shock cord attachment won't interfere with the nose cone. Slip the shock cord through these slits as shown and push the paper back in place. Apply glue to the outside of the attachment.



PAPER TAB METHOD

Cut a regular piece of card stock and tie the shock cord around it. Form it to the inside of the tube and glue in place, far enough down inside the tube so the nose cone can still be placed into the top of the tube.



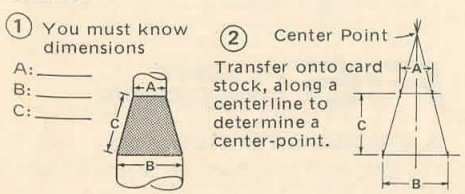
F. PARACHUTE ATTACHMENT

Parachutes may be attached in a number of ways. The shroud lines may be tied to the screw eye or nose cone lug, or they may be tied to the eye of a snap swivel. The snap swivel can then be attached to the nose cone. The snap swivel not only keeps the shroud lines from becoming tangled, but allows quick changing of parachutes from different models.

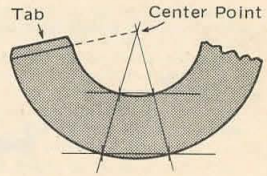
Another technique is to tie the cord through the eyelet, and then tie its free end around the shroud line loop.

G. HOME-MADE PAPER REDUCERS

Making your own paper reducers (or shroud) requires drafting tools, practice and lots of precision!



3 Draw arcs thru all four intersections using a compass.



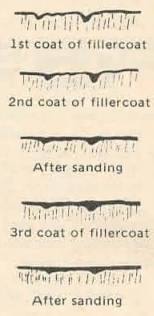
F:3 FINISHING TECHNIQUES

A model rocket that has a good finish on it and is impressively painted will become a show piece. A good finish is easy to create, and only takes a little practice. The techniques listed below will help you get a good finish every time.

A. FINISHING BALSA

All balsa parts have wood grain which must be filled with a specially prepared filler before painting. If this is not done, unsightly grain will appear through the paint.

Lightly sand the balsa surfaces with fine sandpaper. Apply two coats of sanding sealer or balsa fillercoat (available at most hobby shops) and allow to dry about 45 minutes. Sand the balsa surfaces thoroughly and apply another coat. Allow to dry and sand again. Continue this process until the desired surface is obtained. You will find it doesn't take very many coats to get a glass-smooth finish.



B. PAINTING

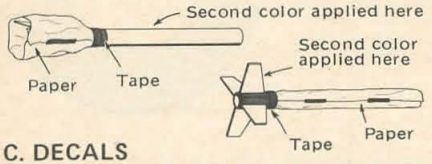
You can use either enamel spray paint or butyrate dope to paint model rockets, although the spray will produce a quicker, tougher and better looking finish. Also, you may apply enamel over completely dry butyrate dope, but NEVER apply dope over enamel, as it will completely ruin the finish.

We recommend that you use a good quality enamel spray paint. Spray painting properly requires a bit of patience and practice. Always hold the spray can about 12 inches away from the rocket and spray with even passes of the can. Don't try to paint the rocket in one coat; use two or three light coats to prevent sags, and then apply a final "wet" coat.

If you wish to use more than one color, apply the lightest color first and allow this coat to dry thoroughly—at least 24 hours. Then mask off the areas you want to stay that color and apply the next lightest color. Continue the process until you have applied all colors to your rocket, then remove the tape carefully.

Masking is an art in itself, but it is not difficult once you try it a few times. Use a good quality masking tape and apply it carefully. You can

mask large areas by using typing paper held down along the edges with masking tape.



C. DECALS

Decals should be applied with care so that they will last the lifetime of the rocket. Make sure the surface is clean and the paint is dry. The smoother the surface the better. Follow the decal instructions for soaking the decal, and avoid touching it with your fingers when applying it, as the oil on your fingers may interfere with the decal sticking properly. Blot the decal carefully to remove all air bubbles and allow to dry overnight. Then cover with a clear enamel spray to protect the decal.

F:4 ENGINE INFORMATION

See your Centuri catalog's engine section.

F:5 RECOVERY TECHNIQUES

The recovery system is one of the most important parts of a model rocket because it returns the rocket safely to the ground, ready for another flight. Few modelers like spending many hours on a model, only to see it damaged by improper recovery on its first flight. In this section we will describe the major types of recovery systems and give you some tips on how to use them.

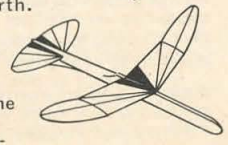
A. TYPES OF RECOVERY SYSTEMS

Parachute: Parachute recovery is perhaps the most common form of model rocket recovery. At ejection, the parachute fills with air and opens over the rocket, slowing the descent to a soft landing.

Streamer: A streamer is a long, narrow piece of crepe paper, plastic or mylar which unfurls at ejection and creates drag as the wind passes by it. It slows the rocket down for a safe recovery. Streamers work well in small diameter lightweight models.

Tumble: Tumble recovery is used on very light models. The engine is ejected, changing the stability of the model and causing it to tumble safely back to earth.

Boost-glide recovery: A boost glider returns to earth by glide recovery, usually ejecting the engine along with a power pod that is recovered by parachute or streamer.



Drag Recovery: In drag recovery the model is lightweight, but large enough to create its own drag and slow itself down as it returns to the ground.

B. PACKING PARACHUTES

There are as many ways to pack parachutes as there are model rocketeers. The best and most reliable way we've found is illustrated here.

Hold the canopy at its center and flatten out the pleats. Fold the canopy and lines as shown.

The parachute should be folded and packed just prior to launch, to avoid remaining folded in descent.

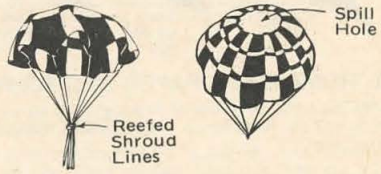
A streamer is simply formed into a roll and inserted into the body tube. At ejection it will unroll and deploy. Be sure to pack it just before launch though, as it will not fully unroll if it is left in the body tube too long.

If you fly in extremely cold weather, you may have to treat your plastic recovery devices to keep them from "setting." Plastic which is left in a cold temperature has a tendency to stick together. You can solve this problem by rubbing chute powder on the parachute. This will make the surface very smooth, will lubricate it and prevent it from sticking.

The amount of wadding used in your rocket is important too. Follow the directions on the package for your first few flights. Soon, you will get a "feel" for how much to use. Remember that the amount of wadding is less important than the volume it fills up. It should be loosely packed but still protect the recovery device.

If your model does not come down fast enough with the parachute you are using, there are several ways to change the descent rate.

1. Use a smaller parachute.
2. "Reef" the shroud lines with masking tape.
3. Cut a "spill hole" in the center of the chute.



F:6 FLIGHT PREPPING

A. LAUNCH SITE CHECKLIST

These are items you should bring with you every time you go to fly model rockets.

Launcher
Firing system
Well-charged battery
Engines
Igniters
Wadding
Masking tape
Scissors
Knife
Screw driver
Glue
Centuri catalog (to check with engines you should use)

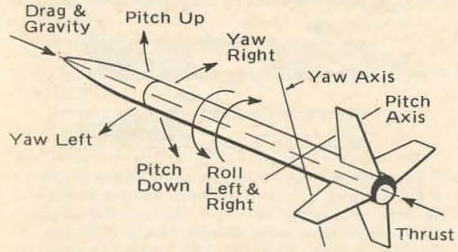
B. PRE-FLIGHT CHECKLIST

1. Pack the recovery wadding into the body tube so the recovery device will be protected.
2. Fold and pack the recovery device, insert shroud line and shock cord, seat the nose cone in place.
3. Select the proper engine and insert it, checking that it fits properly.
4. Make and install a Sure-Shot igniter.
5. Place the rocket on the launcher, clean and attach the micro-clips.
6. Clear the area. Check for low-flying aircraft in the vicinity.
7. Arm the launch controller.
8. Countdown.
9. Launch your rocket!

F:7 STABILITY & PERFORMANCE

A. FORCES ACTING ON A MODEL ROCKET

A model rocket flying through the air has many forces which act upon it. See the diagram below.



The forces of thrust (produced by the rocket engine), drag (from the air moving across the rocket) and gravity all act on the rocket along its longitudinal (long) axis and are called linear forces. The rocket also is subject to rotational forces (pitch, yaw, and roll) which act about rotational axes.

The point on the rocket where all these axes meet is called the Center of Gravity (CG). It is the point where the rocket balances.

There is also a point on the rocket where all aerodyanmic forces can be considered to be acting. This is known as the Center of Pressure (CP). It is not as easy to find as the CG. Centuri's TIR-33 gives a detailed mathematical analysis of the method of finding the CP of a model rocket—but you don't have to do that to find out if the rocket is stable.

B. BASIC RULE OF STABILITY

All you need to know about stability is when your rocket is in flight, it must always have the Center of Gravity (CG) ahead of the Center of Pressure (CP).

STABILITY TEST

An easy way to test for stability is the "swing test." Get a six foot long piece of fairly substantial string and tie it around the balance point of your fully loaded (with engine) rocket. Go out into your back yard or other open area and swing the rocket around your head, watching it as it passes. If the rocket points straight in the direction of flight, it is stable. If it doesn't, don't fly it until you have made at least one of the following corrections:

1. Add weight to the nose (moves the CG forward, ahead of the CP)
2. Add larger fins at the back (moves the CP ck, back, behind the CG)

Once you have made your corrections, test your model again to see if it is stable. If it still isn't stable, make further corrections.

The swing-test sometimes causes rockets to be "over-stabilized." Some Centuri kits won't quite pass the test, yet all are very stable in flight.

C. PERFORMANCE

While there are many factors acting on a model rocket in flight, few of them can be controlled in order to increase performance. Rotational forces (pitch, yaw and roll) are the result of air acting on the rocket and (except for roll) cannot be controlled. Gravity is the same no matter where we fly on the Earth, so that leaves us with thrust and drag. Thrust can be changed by using a more powerful engine, but to increase the performance of the model itself we can only change the drag on the model.

How can we change drag? What are the factors which affect drag? The drag on a model rocket can be expressed as follows: $D = \frac{1}{2} C_d \rho V^2 A$

Where D = Drag on Rocket
A = Frontal Area
V = Velocity of Rocket
ρ = Density of Air
C_d = Drag Coefficient

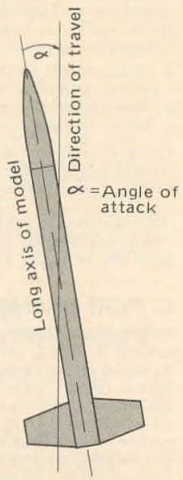
This looks more diffiucIt that it is. All this equation says is that drag is affected by the frontal area of the model, the speed at which it is travelling and the density of the air through which it travels. Whats more, it tells us that the velocity of the model is the most important factor; as velocity goes from 100 feet per second to 200 feet per second, drag goes from 10,000 units to 40,000 units (the square of the velocity).

Of all these factors, only two are easily controlled. Air density is fairly constant, and velocity depends on the size of the engine, the weight of the model and other factors. This leaves us with frontal area and the drag coefficient.

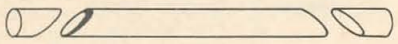
Drag increase or decrease directly with frontal area. If we decrease frontal area, we decrease drag. There are a number of ways to decrease frontal area: use a smaller body tube size, use no transition sections, reduce the number and size of fins, However, we must always be careful when changing parts on a rocket that we keep it stable in flight. To get the best performance from your rocket, a good general rule is to use the smallest diameter body tube and smallest size fins THAT WILL GIVE YOU ADEQUATE STABILITY!

Another way to reduce frontal area on your model rocket is to give it a smooth finish. Finishes that have bumps and chips in the paint, rough edges or grain showing through on balsa surfaces present a great deal more surface area to the on-coming air and therfore have more drag. Strive to get a super-slick finish on your model by following the tips in the section on finishing in this manual.

One particular type of drag that can be greatly reduced by the modeler is called induced drag. Induced drag is the drag which results from the altitude at which the model "attacks" the air or by objects on the surface of the model which directly cause the production of drag. One type of induced drag is caused by high angles of attack (see diagram). If the model is not pointing in the direction of the flight it presents a much greater surface area to the air and drag increases. High angles of attack occur when a model wobbles through the air. You can reduce this problem by making the model more stable—add more nose weight or increase fin sizes.

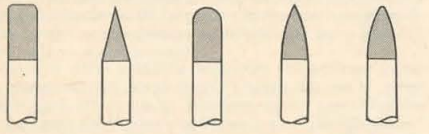


The rocket's launch lug can also be a major source of drag. In fact, studies have shown that it can account for up to 30% of the total drag on the model. You can help reduce this drag by trimming the launch lugs to a streamlined slope as shown below.



One of the most important ways to help cut drag is by using the proper shapes. While sharp angles and pointy shapes may look like they give better performance, studies have shown that at the speeds at which model rockets fly, rounded shapes have the lowest drag. This brings us back to the last factor in the drag equation—the drag coefficient.

The drag coefficient (C_d) is a dimensionless factor that brings into the equation some knowledge about the shape of the model. The less streamlined the model is, the higher the drag coefficient. Every part of the model rocket has a drag coefficient of its own, even nose cones.



0.9	0.2	0.1	-.02	-.05
Flat	Conical	Rounded	Ogive	Parabolic

Here you can see the parabolic shape has the the lowest drag coefficient and the least drag. Notice that it is rounded; there should never be any sharp angles on your rocket if you want to have the best performance possible.

The idea of using rounded shapes applies to fins, too. Fin cross-sections should be shaped to a streamlined "fish outline" (rounded in the front and drawn to a point in the back). Also, use the fin shapes which are rounded (such as an elliptical shape) which help to reduce drag.

Keeping these factors in mind will help you increase the performance of your rockets.

F:8 MULTI-STAGING

A. WHY MULTI-STAGE?

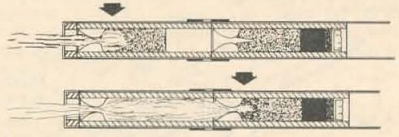
Using more than one stage on a model rocket can greatly increase altitude. Two engines which fire in succession will often carry your rocket higher than if you clustered them in a single stage. It is important to understand how multi-staging works before trying this complex model rocketry technique.

B. HOW PASS-PORT* STAGING WORKS

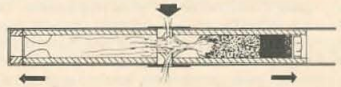
*U.S. Patent No. 3,721,193

The lower stage of the rocket contains a booster engine which has no delay or ejection charge (that's why the designation of the delay charge is "0." Example: A8-0, B14-0, etc.)

As the engine fires, the propellant burns until a very thin wall of propellant remains in the booster engine. When this thin wall breaks, hot particles of propellant are thrown forward into the nozzle of the upper stage engine, igniting it.



In the Centuri Pass-Port Staging System, some of the rapidly expanding gases which contain particles of propellant from the booster engine are allowed to escape through 2 ports in the coupler joining the stages. This allows just a split second to ignite the next stage before the first stage drops off.



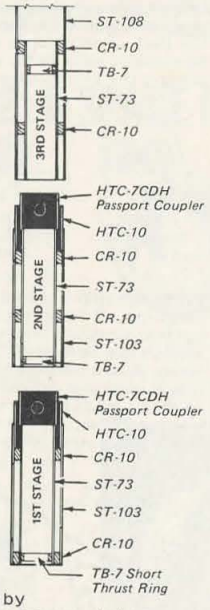
The first stage alone is an aerodynamically unstable body that will tumble or glide safely to Earth. Meanwhile, the second stage climbs, with the thrust of a second stage engine adding a boost to the power of the first stage.

C. CHOOSING THE RIGHT ENGINES

When flying a multi-staged model, ALWAYS use only a booster engine in all but the upper-most stage. Generally, it is not wise to fly a rocket with more than three operable stages, as the safety factor of 4 or more staged rockets goes down dramatically. The upperstage engine should be of the standard type, with a delay and ejection charge to activate the recovery system. In most cases, the delay charge should be of greater duration than with a single stage rocket, since the velocity of multi-staged models is much greater and they therefore need more time to coast to peak altitude. Booster engines are almost never used in non-staged rockets, except in special cases such as the Centuri Flying Saucer and X-24 Bug kits.

D. DESIGN AND CONSTRUCTION

When mounting engines in multi-staged rockets, follow the example shown here. Each stage must be coupled by the special "Pass-Port" coupler (HTC-7CDH) in order for each stage to work properly. In rockets with larger body tubes than a number 7 each stage should be coupled with a stage coupler for that size tube. Best performance will be obtained using a number 10 tube.

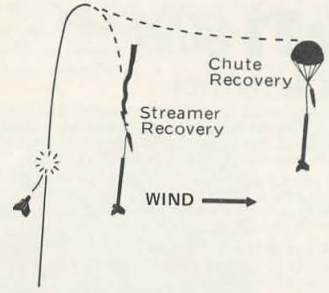


E. STABILITY

Multi-staged rockets need to be stable just like single-stagers. The extra weight in the rear of the model means you will need greater fin area. Check each section of the rocket separately, starting by doing the "swing test" for uppermost stage, then adding each stage one at a time and checking stability.

F. RECOVERY

Because multi-staged rockets fly to very high altitudes, then have a greater tendency to drift. Try using a streamer or parachute with a spill hole to reduce drift. Never fly multi-staged rockets in high winds as they have a tendency to fly into the wind and may end up a long way from the launch site.



G. SPECIAL FLYING PRECAUTIONS

1. Be sure to use booster type engines in each booster stage.
2. Use an engine with a delay and ejection in the uppermost stage.
3. Never use a standard engine in the booster as this will almost certainly cause a crash.
4. Be sure all engines have their nozzles pointing rearward.
5. When fully prepped, stages must couple together smoothly and snugly. Fit should be tight enough so that boosters do not fall out of upper stage by their own weight.
6. Fly over soft dirt or grass to minimize damage to the tumbling booster as it lands.

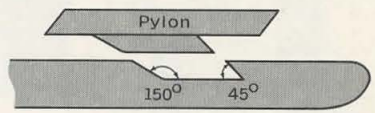
F:9 BOOST GLIDERS

One of the most exciting aspects of model rocketry involves launching gliders with model rocket engines. There are various kinds of boost gliders, but in each case the rocketeer must solve the problem of launching a glider (designed to fly at low speeds) by means of a rocket engine (designed to fly at high speeds).

A. TYPES OF GLIDERS

Many designs have been used to solve these problems. The varied designs of boost-glider vehicles include the forward engine B/G, the rear engine B/G, the pop-pod and the parasite. Of these four types, the most common today are the last two.

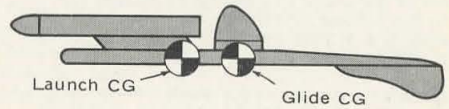
In a pop-pod boost glider, the rocket engine is enclosed in a "pod" made up of a body tube, nose cone, thrust ring, recovery system and a balsa (or other type of wood) pylon which attaches the pod to the glider. There are several methods of pod attachment, the most common being the "piece x" attachment, in which a small piece in the shape shown below is cut out of the body of the glider and attached to the pylon.



A parasite glider is one which is carried aloft on a larger very stable rocket booster. A good example of this is the SST Shuttle kit. In the case of both the pop-pod and the parasite, the glider is boosted to peak altitude by the addition of a rocket which makes the glider stable during boost. After boost, this rocket portion is ejected and the glider returns to earth in a normal aerodynamic glide.

B. GLIDER FLIGHT

Making your B/G fly properly in both the boost and glide phase can be a difficult problem. When a glider glides through the air, its aerodynamic surfaces (wing, horizontal stabilizer and rudder) provide the lift to sustain flight at low airspeeds. The center of gravity for gliding should be in a specific location on the wing. However, during boost, the wing should not act to create lift. It is necessary to move the center of gravity forward so it is substantially in front of the wing. The addition of a pop-pod, with the weight in the front, accomplishes this.



C. DESIGNING A GLIDER

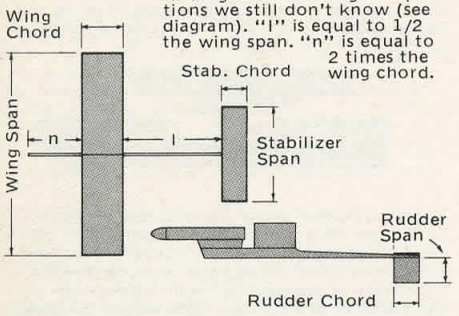
You can design your own pop-pod boost glider using the parameters give below. When designing any glider, start by selecting the area of the wing. From there, the other dimensions will fall into place. The chart below will give you a rough idea of how much wing area to use for any power engine.

ENGINE TYPE	WING AREA
½A	20 sq. in.
A	30 sq. in.
B	45 sq. in.
C	60 sq. in.

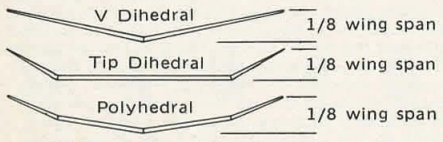
The area of a rectangular wing is equal to the length (span) times the width (chord). Choose a dimension for one side, plug it into the formula and it will give you the dimension for the other side. (Ex: for ½A gliders, A = 20 sq. inches. If the wing is 2 inches wide, then it is 10 inches long).

From these dimensions we can get the other dimensions of the glider. The area of the horizontal stabilizer is equal to 1/3 to 1/4 of the wing area. The rudder should be 1/10 the wing area. Determine the dimensions of the span and chord of each of these pieces as you did with the wing, by choosing a dimension for either span or chord and plugging it into the formula to get the other dimension.

Now we have dimensions for all the surfaces of the glider. The body length is determined by finding the remaining two portions we still don't know (see diagram). "l" is equal to 1/2 the wing span. "n" is equal to 2 times the wing chord.



Finally, we need to determine dihedral, which is the angle between wing panels. This is equal to 1/8 of the wing span for each side. As you can see, there are a number of ways to form dihedral. The small V type is the easiest to make, but try different kinds.

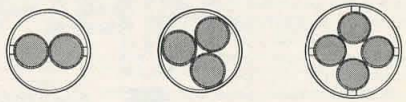


The last step is to make a pod. The pylon should be large enough to keep engine exhaust off of the wing. This should be at least 1/2 to 3/4". Make sure the pod will come off smoothly at ejection, but isn't so loose it falls off before launch.

Make sure you trim your glider before launch. Small bits of clay can be added to correct for stalls and to make the glider turn left or right.

F:10 CLUSTERED ENGINES

Sometimes a single engine is not enough to launch a large heavy model. Clusters of several engines are used to accomplish this task. Remember that when engines are clustered they should be close to each other and should be balanced around the counterline of the rocket.

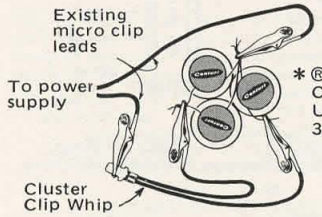


2 engine mount in #16 tube

3 engine mount in #16 tube

4 engine mount in #20 tube

When igniting a clustered model you should always use a 12 volt car battery to ensure sufficient current to ignite all the engines. You should always use Sure-Shot* igniters and a cluster clip-whip. A clip whip can be made from regular 18 guage wire and micro clips. Each clip should have as many leads as you have engines to ignite. Clip one lead from each clip whip to each igniter and make sure none of the clips touch each other.



*®Reg. T.M. Centuri U.S. Patent No. 3,422,763

Before packing the engines into your rocket, place a small amount of recovery wadding in the front end of each engine. This will prevent the damage to your model if one engine does not fire. Many times the ejection charge from one engine can start another engine burning from the ejection charge end.

F:11 ON YOUR OWN

MORE ACTIVITIES

- Get involved in model rocketry by joining a local rocket club. You should also join the National Association of Rocketry (NAR) for more extensive rocketry activities.
- Join the Centuri Aerospace Team (CAT)—Centuri's special club for customers who want factory-direct info on special offers and products.
- Build and fly more Centuri kits, increasing your abilities by advancing upward through higher skill levels.
- Design your own rocket—Centuri's Design Manual can help you here.
- Take part in local, regional and national model rocket contests sponsored by the NAR.
- Tell your teacher about Centuri rockets and to write to us for free information on using model rocketry in the classroom.

Just write: Centuri
P. O. Box 1988
Phoenix, AZ 85001

Rocket Times
THE OFFICIAL Centuri MODEL ROCKETRY MAGAZINE

FOURTH WORLD SPACE MODELING CHAMPIONSHIPS

From September 7th through 12th, 1980 the National Association of Rocketry hosted the Fourth World Space Modeling Championships at the U.S. Naval Center at Lakehurst, NJ. This, the first United States "Internats", attracted contestants from the US, Canada, Great Britain, Spain, West Germany, Australia, Bulgaria and Poland.

Centuri participated in the opening ceremonies with a spectacular flight demo. The contest had an "Olympic" feeling to it as each nation tried to win the gold medal in each of six events.

The US Team did exceptionally well, bringing home a total of six gold medals, seven silver and three bronze medals. In addition, the US Team won the overall Team Championship for the meet, the world championship of model rocketry!

The US did very well in the streamer duration, payload and scale altitude, taking gold medals in all three events. They took silver and bronze medals as well as team gold medals in scale altitude.

US Team search for thermals with their RC glider entries.

A Bulgarian team member slides his 1st place winning scale model of the Russian Soyuz on to the launcher.

The scale competition went to the Bulgarians who flew three beautifully scaled replicas of the Soviet Soyuz launch vehicle. The Bulgarians also took the gold in boost glider, beating out 1978 World Champ "Guppy" Youngren in a closely fought fly-off after each country turned in three "max" flights in regular competition.

All in all the meet was a great deal of fun and offered the opportunity for many American rocketeers to make friendships with their counterparts in other parts of the world. Everyone looks forward to the Fifth World Championships, now scheduled for for 1982.

"WAR IN SPACE"... WILL IT HAPPEN?

Satellite killers will play an important role in any future superpower conflicts. Designed to move close to existing communications and military satellites and destroy them, this offensive capability is important in reducing enemy strike potential.

Today there are thousands of satellites in Earth orbit and only a small percentage perform duties related only to peace-time activities. In some cases, it is not clear what the functions of Russian military satellites are.

In the event of an enemy attack, satellite killers would be valuable in helping to knock-out enemy communications. Over 70% of all military communications are now handled by special communications satellites, and satellite killers that could destroy this network would help to dramatically reduce the effectiveness of an enemy attack. Many military experts believe that the use of satellite killers to destroy communications and surveillance satellites would be a precursor to a full-scale enemy attack.

At the present time, the method of attack is simple—the satellite killer moves close to it's target and explodes damaging or destroying the target with shrapnel. It is conceivable that in the near future, satellite killers will be equipped with high-powered lasers which would destroy a target satellite. The Centuri Satellite Killer is an example of the latter type—a reusable satellite weapon of the future.

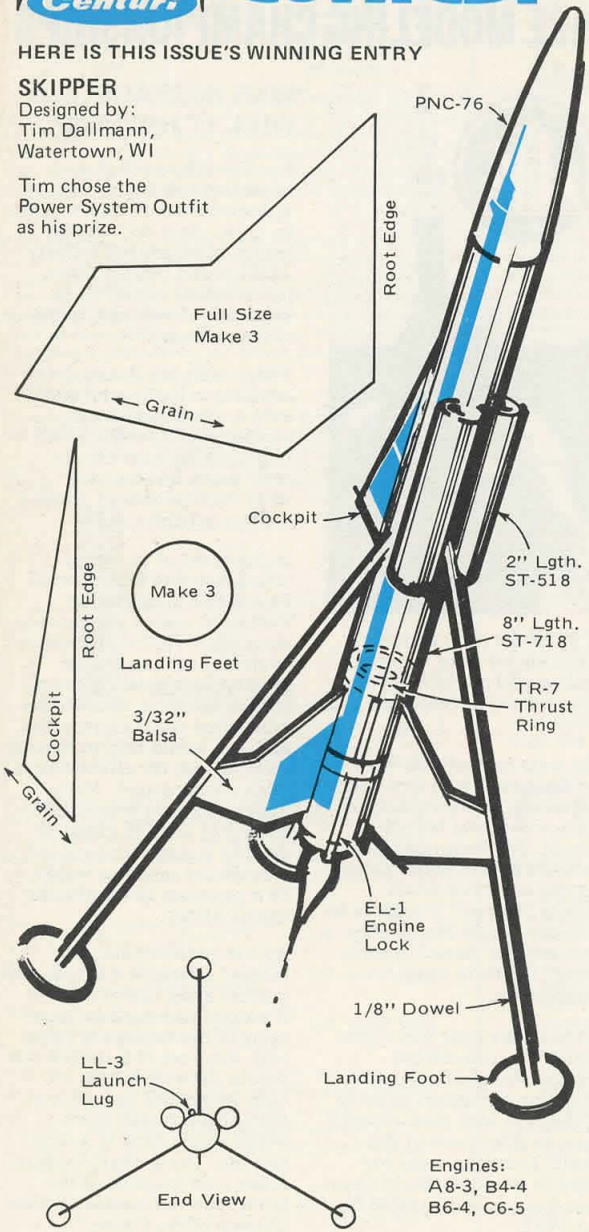
Design Contest

You could be a winner in Centuri's Design Contest. Build your own imaginative rocket from Centuri parts.

HERE IS THIS ISSUE'S WINNING ENTRY

SKIPPER
Designed by:
Tim Dallmann,
Watertown, WI

Tim chose the Power System Outfit as his prize.



Engines:
A8-3, B4-4
B6-4, C6-5

CONTEST RULES

1. Entries must consist of a photograph of the model and a drawing which includes a parts list and your name and address.
2. Entries must be flight worthy and not copies of kit designs produced by model rocket manufacturing companies or other published designs.
3. Entries become the property of Centuri and can not be returned.
4. Employees of model rocket companies and their families are not eligible.
5. Entries judged on originality, neatness and completeness.
6. Do not send the actual model.
7. Send as many DIFFERENT entries as you like, but no duplicates.
8. There is no deadline. A winner is selected twice yearly and notified by mail.
9. Specify which prize you want.

PRIZE

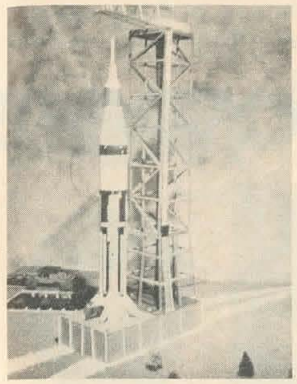
The winner will receive a prize of his or her choice . . . any ONE product from the current Centuri catalog! It can be any model rocket product we have . . . right up to the fantastic Saturn V kit or Power System Outfit!

TIPS

- Choose from available parts.
- Avoid large forward fins.
- Use your imagination.
- Make your entry clear and readable.
- Take your time and do a good job.
- Take the best quality photo possible.

Photo shows second place winner. **Javelin II** designed by: Allen Vermette, Winthrop Maine.

PHOTO CONTEST



David Dhalstrom and Bobby Scheibling are this issue's photo contest winners. Their professional-like entry shows a Saturn 1B being transported on a mobile launcher of their own design.

You can enter this ongoing Photo Contest and try for the prize, a $25 Centuri Merchandise Certificate. A winner is picked for each issue of Rocket Times. Send in your best photo about model rocketry or real rocketry addressed to: Photo Contest, Rocket Times. Black and white photos are best and be sure to try for good contrast and sharp focus.

BLACKBIRD DATA CONTEST

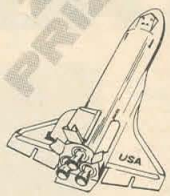
C.A.T. members are invited to test their skills in a new contest. When we designed our new SR-71 Blackbird kit (see pg. 32) we found some interesting facts. The surface temperature of any aeroplane rises as it goes faster as a result of friction generated between its skin and the air molecules travelling over it. Because of this great heat, regular aluminums can not be used because they would melt. What special metal alloy is the the real Blackbird skin made of? The 1st 10 correct entries will be awarded a Magnum-D Hornet kit.

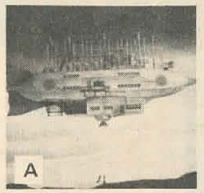
The deadline for entries is Dec. 1, 1981. Send to: Blackbird Data Contest care of Centuri C.A.T. director.

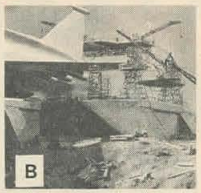
"ANTIQUE" SPACESHIP Contest

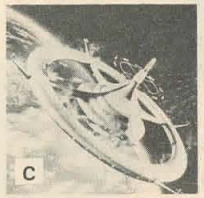
FOR FANS OF "OLD TIME" S.F. FILMS

20 PRIZES









Photos courtesy TV Chariot, Box 234 Dept. C80, Mesa, AZ 85201. Their huge SF slide catalog costs $1.25

Here's your chance to become a C.A.T. contest winner and receive a valuable prize. It's easy too—just follow the rules and match each photo with the correct movie title on the form below. The first 20 correct entries will receive a free Space Shuttle Columbia kit.

RULES:

1. Entries must use coupon below (or facsimile). Blacken one square in each row across.
2. Entries cannot be accepted after December 1, 1981.
3. Prizes awarded to the first 20 people to correctly identify all photos.
4. One entry allowed per person. Entries become the property of Centuri and cannot be returned.
5. Employees of model rocket companies and their families are not eligible.
6. Winners will be notified by mail within 60 days after deadline. Names will be published in next Rocket Times.

Centuri Box 1988 Phoenix, AZ 85001

ANTIQUE SPACESHIP CONTEST

Name _____

Address _____

City _____

State _____ Zip _____

Master of the World	A	B	C	D	E	F
Wild, Wild Planet	A	B	C	D	E	F
Destroy All Monsters	A	B	C	D	E	F
Battle in Outer Space	A	B	C	D	E	F
When Worlds Collide	A	B	C	D	E	F
First Men on the Moon	A	B	C	D	E	F

TV SPACESHIP CONTEST

The 20 winners in our TV Spaceship Contest are listed below. Each identified the spaceships correctly as:

Fireball XL-5—E
UFO—B
Project UFO—D
Captain Scarlet—C
Quark—A
Space: 1999—F

Each winner received a Buck Rogers kit.

James L. Talley Jr., Norcross, GA
James Kerich, Bethesda, MD
Tim Lenon, Rockford, MI
Lorn G. Readnous, Meekes, OK
Morris Argyle, Idaho Falls, ID
Scott Schork, Philadelphia, PA
Mitch Emerick, Philadelphia, PA
Antoine Lloyd, Wyanclanch, NY
Ronnie Taylor Jr., Falmouth, VA
A.J. Urania Jr., Norfolk, VA
Paul Hollendorfer, Colo. Spgs. CO
Merrick Terry, Canada
John Edwards Jr., St. Petersburg, FL
Glenn Chung, Greendale, WI
Byung Lee, Chicago, IL
Steve Kral, Maledonia OH
Mark McCarty, Huntsville, AL
Scott Gilman, Olympia Fields, IL
Benjamin Mant, LaPorte, TX
Ronald Basham, Muldraugh, KY

Join us on the

Centuri Aerospace

You can have your photo here too. Just fill out the Data Form included in your CAT membership packet and send it in with a clear photo of yourself (preferably black & white). Maybe you'll appear in the next Centuri catalog!

KURT SINGERMAN: 13 year old Kurt has been an active rocketeer in Fairborn OH for over 2 years now. He thinks Centuri instructions are the best and dreams of riding in a real rocket someday.

JOHN RATHER: 16 year old John enjoys giving lecture demonstrations at the public library in Racine WI. He is an active NAR member and enjoys teaching model rocketry as well as being an active competitor.

JEANNE BRADY: Jeanne is 7 and lives in Washington MI. Her mother introduced her to model rocketry and now she enjoys it as much as her other hobbies of gymnastics and dancing.

NEIL GLOVER: Neil of Jefferson OH is 17 years old and is designing and building a radio controlled launch tower for his Saturn V. Soon he'll be going to college to become an Aerospace Engineer.

SAMMY HO: 12 year old Sammy is a member of a local model rocket club in New Carrollton MD and says when the club launches they always get a large crowd of spectators. Sammy would like to become an astronaut someday.

DARRON WOODS: Darron is a two year model rocketry veteran from Union City CA. He's 14 and hopes to someday design and build his own rocket to ride in himself! Darron enjoys pets and hopes to be become a veterinarian.

BREN BAILEY: In Charlotte NC it's Bren who steals the show, TV that is! Bren was selected for an episode on rocketry for the popular TV show Kidsworld this year. When he's not busy signing autographs Bren likes to design rockets. At 17 Bren is becoming a local model rocket celebrity.

HERE ARE 10 GOOD REASONS TO JOIN THE C.A.T. NOW!
All this for only $2.00

C.A.T. Team

1. Your own copy of the next Centuri catalog, sent automatically.
2. The chance to enter and win C.A.T. contests.
3. The chance to be in the catalog.

4 C.A.T. DATA FORM
Probably the most important part of your C.A.T. kit! You complete this simple form about your model rocketry activities to become eligible to have your photo in a future issue of this catalog.

5 IRON-ON SHIRT INSIGNIA
A large 6"x7" three-color emblem for your T-shirt or jacket. Easily irons on and remains permanently. You'll be proud to identify with other Rocketeers.

6 MODEL ROCKET DESIGN MANUAL
Worth $1.25 by itself! Large 8½"x11" book, contains 32 illustrated pages. Explains design tips, construction techniques plus dozens of photos and over 100 diagrams.

7 C.A.T. DECAL SHEET
Impressive 3-color decal containing 16 Team insignias. Measures 3½"x9". Colors are red, white, and blue.

8 C.A.T. MEMBERSHIP CARD
Wallet size card identifying you as a member of the "Team." Also has Safety Code on back of card.

$3.20 VALUE only $2.00

9 C.A.T. WALL CERTIFICATE
A beautifully lithographed certificate with your name inscribed and ready for framing.

10 C.A.T. FIELD BOX STICKER
Apply this colorful I.D. sticker to your notebook, bicycle, car, field box, or even your rocket.

Special ...

C.A.T. CLUB MEMBERSHIP
Now, 3 or more rocketeers joining the C.A.T. at the same time can also get the special Club Membership for only $2.50. It includes certificate with your club name, current catalog and these 3 popular books for your club library: Club Guide, Rocketeers Guidebook and Power-System Handbook. To qualify, at least 3 must join the C.A.T., using the same envelope.

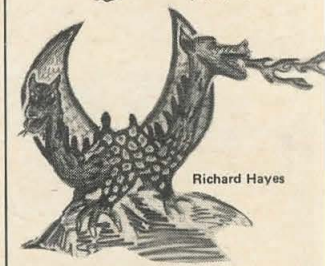
$4.00 VALUE only $2.50

C.A.T. News

THUNDER ROC CONTEST WINNERS

Thanks to the many C.A.T. members who sent in entries to last issue's "Thunder Roc" contest. The 20 winners listed below each received a Centuri Thunder Roc kit. Two of the 20 winning drawings are shown below.

Curtis Chi



Richard Hayes

Sam L. Lowe, Louisville, KY
Andy Robinson, Pittsfield, MN
Andy Berrios, Colorado Sprgs, CO
Chris Hesterman, Canada
Craig Haugrud, Pelican Rapids, MN
Scott Kimball, Walnut Creek, CA
Joey Earls, Delaware, OK
Curtis Chi, Conover, NC
Chi Wong, Canada
Ravindra Lalka, Rocky Mount, NC
Richard Hayes, Canada
Lawrence Bercini, High Point, NC
Anuphong DeYoung, Wahiawa, HI
Bryan Caldwell, Dallas, TX
Josh Steiner, Beverly Hills, CA
Douglas Dengel, Seldon NY
Kenneth Lukban, Canada
Scott Gross, Bennington, VT
Khalid Aryne, Fairless Hill, PA
Philip Levy, Madison, WI

Centuri Box 1988, Dept 718 Phoenix, AZ 85001

Available only by mail from Centuri. The "Special Items" $1.50 handling charge not required on these.

PROMOTIONAL ORDER FORM # 811

Name _____

Address _____

City _____

State _____ Zip _____

Prod. No.	Qty.	Description	Pg.	Ea.	Total
5460		C.A.T. Membership	61	2.00	
5459		C.A.T. Club Memb.*	61	2.50	
907383		M.R. Hq. Poster	63	1.50	

*CLUB NAME: _____ $ _____

You may use a facsimile of coupon, to avoid cutting your catalog.

IMPORTANT NOTICE: Centuri model rocketry products are intended for hobbyists and experimental and educational usage. Model rocketry has one of the best safety records of any action hobby or outdoor recreation. However, it is still important that the utmost care be exercised in the use of our model products and that all storage and operating instructions are followed. Centuri model rocketry products are recommended for ages 10 to adult. Adult supervision is suggested for those under 12 years of age. It is also important that you use your model rocketry products in accordance with your local applicable laws.

Safety Code

1. CONSTRUCTION — My model rockets will be made of lightweight materials such as paper, wood, plastic, and rubber without any metal as structural parts.

2. ENGINES — I will use only pre-loaded factory made model rocket engines in the manner recommended by the manufacturer. I will not change in any way nor attempt to reload these engines.

3. RECOVERY — I will always use a recovery system in my model rockets that will return them safely to the ground so that they may be flown again.

4. WEIGHT LIMITS — My model rocket will weigh no more than 453 grams (16 ozs.) at lift-off, and the engines will contain no more than 133 grams (4 ozs.) of propellant.

5. STABILITY — I will check the stability of my model rocket before its first flight, except when launching models of already proven stability.

6. LAUNCHING SYSTEM — The system I use to launch my model rockets must be remotely-controlled and electrically operated and will contain a switch that will turn to "off" when released. I will remain at least 15 feet from any rocket that is being launched.

7. LAUNCH SAFETY — I will not let anyone approach a model rocket on a launcher until I have made sure that either the safety interlock key has been removed or the battery has been disconnected from my launcher.

8. FLYING CONDITIONS — I will not launch my model rocket in high winds, near buildings, power lines, tall trees, low flying aircraft or under any conditions which might be dangerous to people or property.

9. LAUNCH AREA — My model rockets will always be launched from a cleared area free of any easy to burn materials, and I will only use non-flammable recovery wadding in my rockets.

10. JET DEFLECTOR — My launcher will have a jet deflector device to prevent the engine exhaust from hitting the ground directly.

11. LAUNCH ROD — To prevent accidental eye injury I will always place the launcher so the end of the rod is above eye level or cap the end of the rod with my hand when approaching it. I will never place my head or body over the launching rod. When my launcher is not in use I will always store it so that the launch rod is not in an upright position.

12. POWER LINES — I will never attempt to recover my rocket from a power line or other dangerous places.

13. LAUNCH TARGETS & ANGLES — I will not launch rockets so their flight path will carry them against targets on the ground, and will never use an explosive warhead, nor a payload that is intended to be flammable. My launching device will always be pointed within 30 degrees of vertical.

14. PRE-LAUNCH TEST — When conducting research activities with unproven designs or methods, I will when possible determine their reliability through pre-launch tests. I will conduct launchings of unproven designs in complete isolation from persons not participating in the actual launching.

ROCKET ACTIVITIES

1. These are some of the organizations which have model rocketry programs. Check in your community.

Schools	Youth Centers	Museums	Park Departments
4-H	Church groups	Jay-Cee's	Vocational Training
Camps	YMCA/YWCA	Kiwanis	Observatories
Scouts	Lion's Clubs	Boy's Clubs	Civil Air Patrol

2. Ask your local rocket dealers. Look in the yellow pages under "Hobby and Model Construction Supplies".
3. Ask at nearby schools. Many clubs are school affiliated.
4. Form your own club following the Centuri Club Guide.
5. Join the N.A.R. As a member you may ask for a list of N.A.R. sections (clubs) and members in your area.

The National Association of Rocketry is THE official nonprofit organization for model rocketry. Open to all serious rocketeers, membership includes competition book, license, insurance, decals and monthly magazine. The NAR establishes safety rules, certifies records, publishes technical materials, and promotes model rocketry. See address below (other addresses are of similar organizations outside U.S.).

National Association of Rocketry
182 Madison Drive, Dept. C-81
Elizabeth, PA 15037

Canadian Association of Rocketry
Dept. C-81, Suite 302
151 Slater St.
Ottawa, Ontario K1P5H3, Canada

Rocketry Advancement Soc. of Australia
P.O. Box 287
Summer Hill, NSW 2130
Australia

New Zealand Spaceflight Association
P.O. Box 2945, Dept. C-81
Wellington, New Zealand

Swiss Astronautical Society (SAFR)
Lidostrasse 5
CH-6006 Luzerne
Switzerland

Dutch Rocket Research Assoc.
Box 323
3800 AH Amersfoort
Netherlands

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		5171	20	5321	26	5349	32	5692	39
				5325	18	5352	32	5836	39
				5330	25	5404	6	6500	44

THE "LINE-UP"...

This photo displays nearly the entire line of Centuri kits. It's a handy reference for color schemes and size comparisons.

POSTER OFFER!

Send for a huge 13" x 26" version of this "Model Rocket Headquarters" wall poster. Only $1.50 (prod. #907,383). Use the handy coupon on page 61.

FULL ONE YEAR Warranty

Your Centuri product is warranted against defects in materials or workmanship for one year from the date of the original purchase. Any Centuri product which, because of a manufacturing mistake, malfunctions or proves to be defective within the one-year warranty period will be repaired or replaced, at Centuri's option and at no charge to you, provided it is returned to Centuri with proof of purchase.

This warranty does not cover incidental or consequential damage including injury or damage to persons or property caused by the use, abuse, misuse, failure to comply with operating instructions or improper storage of the warranted product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

For repair or replacement under this warranty please return the defective part of your Centuri product with proof of purchase to Centuri in care of Consumer Relations Department.

Centuri

NEW THUNDER HAWK OUTFIT

Altitudes up to 1200 feet!

3 FREE ENGINES!

LONG, LEAN AND LOW-COST!

Get going in model rocketry with this Starter Set featuring one of Centuri's most popular kits—Thunder Hawk! This easy-to-build model is nearly two feet long, with lean lines for fast and hi-flying fun. This version features parachute recovery also includes Lightning Bolt Launcher (battery not included), and enough engines and supplies to get your model rocketry career off to a flying start!

INCLUDES:

- Thunder Hawk Kit
- Lightning Bolt
- 2 Engines
- 3 Bonus Engines
- Supplies
- Mini-Manual

R&D Tip
Kit also available separately.
See pg. 15

Prod. No. 5208

$11.95

Skill Level

1 2 3 4 5

Centuri products are distributed internationally by:

CANADA:
International Games of Canada, Ltd.
3227 Lenworth Drive
Mississauga, Ontario, Can. L4X2G8

AUSTRALIA:
Dawn Trading Co.
17 Tenterden Rd.
Botany, NSW Aust.